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ABSTRACT

If an effective school is defined as a school that causes student improvement on a number of important educational outcomes, the problem of identifying effective schools becomes one of establishing legitimate predictions of student performance and comparing those predictions to actual student or school outcomes. In attempting to identify effective schools, it is essential that methodologies be applied that are value-added and that account for student-entry characteristics as well as student growth on the outcomes of interest. This paper examines the similarities and differences between the student-based regression-based model used by the Dallas Independent School District (DISD), Texas, for the past 3 years and a number of models using two-level hierarchical linear modeling. Specifically, the study sought to determine the differences in results produced by a regression model using first- and second-order interactions and a two-level hierarchical linear model (HLM). The results suggest that student-based models that account for first- and second-order interactions among variables and two-level hierarchical linear models produce very similar school ranks. Ranking schools purely on the basis of absolute test scores is clearly biased against schools with large populations of poor students, minority students, and black students. It is recommended that two-level HLMs be used to rank schools in combination with a first regression and prediction stage that accounts for the variance associated with student-level background variables. It is important that both student-level and school-level contextual information be included in models for identifying effective schools. (Contains 21 references and 14 tables.) (LMI)

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ED 389 079

Alternative Methodologies For Identifying Effective Schools[1]

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Abstract

One of the most important aspects of managing a school district, particularly in the current era of site-based management, is the identification of schools that are unusually effective with the students that they serve. In attempting to accomplish this, it is essential that methodologies be applied that are value-added and that account for student entry characteristics as well as student growth on the outcomes of interest. If an effective school is defined as a school that causes student improvement on a number of important educational outcomes, the problem of identifying effective schools becomes one of establishing legitimate predictions of student performance and comparing those predictions to actual student or school outcomes. This paper discusses alternative methodologies for identifying effective schools and compares and contrasts school rankings obtained from student-based regression models as well as two-level hierarchical linear models. The results suggest that student-based models that account for first and second order interactions among variables and two-level hierarchical linear models produce very similar school ranks. However, since two-level hierarchical linear models with appropriate conditioning variables model between and within school variables simultaneously and adjust correlations between residuals and school level context variables to zero, it is recommended that two-level hierarchical linear models be used to rank schools in combination with a first regression and prediction stage that accounts for the variance associated with student level background variables.

In recent years there has been increasing pressure from state legislators and boards of education, local boards of education, and many segments of society for increased educational accountability. This pressure has resulted in 44 states initiating some form of testing program and/or accountability system. Most of these systems have emphasized standardized tests and

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(NCREL, 1993). No adjustments are typically made for student entry-level characteristics that are related to achievement but are not under the influence of the schools. All students are usually included in the analyses whether they have been enrolled in a school for a day or a year. Thus, it can be said that many of these systems evaluate students, not schools.

School effectiveness indices, as discussed in this paper, emphasize improvement by students who are actually exposed to a school's instructional program. Baseline data are utilized to create student or school level predictions based on each school's unique student population. Effective schools are defined then as those schools that cause the most students to exceed prediction by the largest amount. Only continuously enrolled students, or students who had minor interruptions to their continuously enrolled status, are included in the analyses. The essential element is improvement. While it is recognized that there are a number of student entry characteristics that schools cannot control, schools are held accountable for impacting those outcomes that they can control. Since all of the methods investigated in this paper are essentially norm-referenced measures (that is, in order for someone to exceed prediction, someone else must fail to meet it), there must be an additional component to the accountability system that emphasizes improvement on absolute goals. This would not be the case if one could establish the equations in year "n" and continue to use them in years "n+1", "n+2", ... "n +m". However, since the State Education Agency changes tests every year, and there is no guarantee that the tests have been appropriately equated, new equations must be established each year based upon the new relationships.

Background

The accountability system that is being implemented in the Dallas Independent School District (DISD) is a three-tier system. The first tier focuses on the school level. Under the District's plan to move from a school system to a system of schools over a five year period, each school is held responsible and accountable for many aspects of its own operation. School Improvement Plans (SIPs) are the vehicles through which this is accomplished. School Improvement Plans address improvement in areas important to student success including language arts skills (vocabulary, reading, oral competency, and writing); mathematics problem-solving, concept, and computation skills; science conceptual and problem-solving skills; social studies conceptual and problem-solving skills; parent/community involvement; school climate and safety; student and teacher attendance; student promotion/course passing rate; student enrollment in advanced courses, diploma plans, and honors programs; student graduation rates;

and, college entrance test participation and performance. Absolute goals are established in these areas based on current performance levels versus desired performance levels five years out.

Schools are encouraged to use portfolios, protocol analysis, and other forms of authentic assessment in monitoring their programs. This information can then be used to provide evidence of accomplishment in instances where the more standard types of assessment fail to show progress. Performance testing was built into the District's *Assessment of Course Performance* (ACP) tests. The ACPs are final standard examinations in 72 courses, grades 9-12. One hour was multiple choice while the other hour was to be performance tests. These tests were developed by the Evaluation Division and had detailed scoring protocols. The plan was to have had the performance portion of the tests scored by teachers with random scoring being done by the Evaluation Division. These tests were eliminated from the systemwide testing program by District administration with full support of District principals because the tests took too much time to prepare for, administer, and score.

While it is not clear that the necessary reliability across scores on the performance tests was attainable, it is important that the message be communicated to teachers that the kinds of skills and activities measured by performance tests are the kinds of skills and activities that the District wants them to teach their students. Early evidence on performance tests suggested that they were much more difficult than the average multiple choice tests (Dryden 1991). The District is attempting to ensure that higher order thinking skills are taught by providing schools with training on the preparation, use, and scoring of locally developed performance tests plus providing schools with copies of performance tests prepared for use with the *ACP*'s.

The second tier of the accountability system involves the District Improvement Plan (DIP). The DIP establishes desired outcome levels on the various District accountability objectives and specifies how Central Office Divisions plan to support the schools in meeting these objectives. That is, the DIP contains the strategic plans of each of the District's support divisions relative to their contributions to meeting each of the District's targets. The DIP is the accountability instrument for the District's Central Office Divisions. It also contains the desired levels of District outcomes by 1995 and the intermediate steps necessary to get from 1991 levels to those desired outcomes. It is directly related to the SIPs in that outcome levels that are specified in each of the SIPs are those levels that will help the District reach its goals. The DIP sets the criterion levels for desired outcomes. Goals are absolute. All schools could reach them or no schools could reach them; that is, target accomplishment is not determined by a norm group.

The final tier of the accountability system is the school effectiveness indices. Inherent in the task of identifying outstanding schools are two complex issues:

- how to define effectiveness, and
- how to develop a model to assess effectiveness

In an attempt to provide a better definition of effectiveness and respond to the narrowly focused concern of earlier effective schools research, Murnane (1987), David (1987), and others have been proponents for developing an expanded number of outcome indicators. In addition, Oakes (1989), David (1987), and Cohen (1986) have argued the importance of incorporating input indicators as important aspects of better accountability mechanisms. Possible input indicators often cited in the literature include school enrollment, socioeconomic/ethnic composition, proportion of limited-English-speaking children, enrollments in categorical programs, staff characteristics, and financial resources. Outcome indicators are usually related to capturing the results of schooling on students or providing information about other definitions of "good schooling", and may include student academic performance, teacher and student attendance rates, dropout and completion rates, performance of students at the next level of schooling, parent and student satisfaction, percent of students completing advanced courses, college attendance, and individual school goals (David, 1987; Oakes, 1989; Olson & Webster, 1990; Pollard, 1987; Shavelson, McDonald, Oakes, & Carey, 1987).

Effectiveness indices, as they are implemented in Dallas, are designed to identify effective schools. They include multiple input and outcome indicatiors. (For a complete discussion of the accountability system see Webster and Mendro, 1995). No attempt is made to develop a theory of school effectiveness, but rather to reliably and validly identify those schools that are most effective. To the degree that educational goals vary, school effectiveness has limited meaning. Therefore, the first step in developing methodology to identify effective schools must be the development of a community consensus as to the important goals of schooling.

In Dallas, the important goals of schooling are determined by an Accountability Task Force. The Accountability Task Force is a 27 member committee, appointed by the Board of Education, charged with the responsibility of overseeing the District's accountability system. The membership includes four elementary teachers, three middle school teachers, four high school teachers, four principals, four parents, five members of the business community, and three central office administrators. In addition, the various employee organizations each have an ex-

officio member on the task force. This task force deals with many aspects of the accountability system including methodology, testing, determining and weighting important outcome variables, and determining the rules for financial awards that are related to the accountability system. The Accountability Task Force also hears any concerns or grievances relative to the accountability system. Any attempt to develop school effectiveness indices without input from all of the constituents involved in the educational system will have limited support and impact.

Once legitimate outcomes of schooling have been defined, the only fair and equitable method of comparison among and between schools or districts is one that statistically adjusts outcomes by those inputs that are not under the control of the schools. Many state and district accountability systems report unadjusted school and district data in either a cross-sectional or cross-sectionally longitudinal manner that purportedly allows for the comparison of schools and districts on a number of outcome variables. Absolute student scores on standardized tests is one variable that is often reported. This technique of comparing schools based on unadjusted outcome measures almost always adversely affects schools with population demographics that differ from the norm, a fact that was graphically illustrated relative to ethnic background and SAT scores in a recent article by Richard Jaeger (1992). The non-statistical technique of comparing schools with similar characteristics is one solution for cases involving a limited number of grouping characteristics; however, this approach has serious limitations when there is consistent one-directional variance on the grouping characteristics within the group.

To illustrate this point, examine the group wherein the DISD was classified in the 1992 Academic Excellence Indicator Report published by the Texas Education Agency (TEA). The DISD was 15.9% White, the comparison group was 20.9% White. The DISD was 45.5% African-American, the comparison group was 38.8% African American. The DISD was 66.5% poor, the comparison group was 55.5% poor. The DISD was 19.3% LEP, the comparison group was 17.4% LEP. Thus, on every important variable, the DISD had the group that performed more poorly on the Texas Assessment of Academic Skills *(TAAS)*, the major measure in the State's Accountability system, Statewide, independent of the District from which they were drawn. Is it any surprise that DISD scores were generally below those of the comparison group and the State? Yet, when those scores were adjusted for only the ethnic background of students, DISD students performed at about State levels (Webster, 1992).

To further illustrate this point, Table 1 displays some of the demographic characteristics of the top twenty percent of schools as defined by the 1992 school effectiveness methodology. The reader will note that effective schools, as defined by this methodology, come in all sizes and

TABLE 1

Demographic Characteristics Of The Top Twenty Percent Of Effective Schools

Rank	Grades	Enrollment	% White	% Black	% Hispanic	%DEP	%LEP	State Rank
1	K-3	555	0.4	98.9	0.7	87	0.1	20
2	K-6	238	4.5	15.3	79.7	84	57.9	94
3	K-3	447	2.5	80.1	17.1	84	57.9	94
4	K-3	194	0	98.0	1.5	77	1.5	58
5	K-3	573	0.9	57.4	41.7	80	36.5	77
6	K-6	529	0.2	96.4	3.5	92	2.6	39
7	4-6	193	0.5	85.3	12.7	75	5.7	60
8	4-6	336	1.5	64.0	34.2	87	17.6	83
9	K-6	518	64.5	18.5	10.2	20	2.7	11
10	K-6	462	54.4	16.2	28.4	33	3.5	4
11	4-6	398	0.8	75.5	23.5	71	15.3	88
12	K-6	539	51.9	11.0	31.4	40	15.6	8
13	K-6	656	50.0	27.5	21.7	36	13.4	9
14	K-6	830	37.0	37.8	23.4	51	13.1	26
15	K-6	776	0	99.7	0.3	75	0	50
16	K-3	214	0.5	87.3	12.2	64	8.4	107
17	K-6	630	63.3	7.8	26.0	27	15.3	12
18	K-6	680	0.2	99.2	0.6	51	0	32
19	K-6	569	0.2	99.0	0.9	85	0	30
20	K-6	741	58.6	11.0	20.8	36	12.01	17
21	K-6	860	0.2	88.8	9.6	93	5.0	71
22	K-6	702	4.4	3.5	90.4	81	52.1	86
23	K-6	697	39.0	27.5	29.8	47	22.7	17
24	K-6	571	3.0	20.5	76.1	92	53.9	91
25	K-6	483	55.4	11.3	30.9	18	3.5	3
26	K-6	382	41.1	37.1	19.5	21	0	39
27	K-6	331	0	99.7	0.3	64	0	62
District	K-6	592	16.1	43.7	38.2	69	23.2	

	G	E	%W	%B	%H	%DEP	%LEP	SR
1	7-8	693	13.6	30.8	52.4	85	31.2	10
2	7-8	668	30.3	37.6	29.7	45	15.4	6
3	7-8	888	18.2	16.3	63.2	64	29.9	9
4	7-8*	367	24.4	50.4	22.4	38	0	2
5	7-8	863	7.0	75.4	15.7	30	1.3	5
District	7-8	703	15.2	48.6	34.3	55	13.2	

	G	E	%W	%B	%H	%DEP	%LEP	SR
1	9-12	1129	0.4	97.9	1.7	32	0	16
2	9-12	1004	36.7	37.7	23.3	24	13.0	4
3	9-12*	3567	18.5	43.7	32.9	22	4.8	5
4	9-12*	129	46.9	31.5	17.7	9	0	1
5	9-12*	623	48.4	34.3	15.6	9	0	2
6	9-12*	644	10.2	60.0	25.5	27	1.7	8
District	9-12	1093	15.8	49.8	31.5	28	10.1	

shapes. District statistics at the particular grade levels are also presented to provide the reader with a framework for interpretation of the information.

At the K-6 level, the most effective schools tended to have smaller enrollments than the average enrollment of District elementary schools. Enrollments ranged from a low of 193 to a high of 860. Ethnicities ranged from a high of 99.7% Black, 90.4% Hispanic, and 64.5% White to a low of 3.5% Black, .3% Hispanic, and 0% White. Most deprivation indices were above the District average of 69, ranging as high as 92, while the percentage of limited English proficient students ranged from a high of 57.9% to 0. In short, whether or not a school was ranked among the most effective could not be predicted from the demographics of the students that it served. This is because the system is based on improvement, not on absolute levels of achievement and associated variables.

The last column in Table 1 (SR) depicts the school rank on the percent of students passing all subtests of the TAAS. The top twenty-seven K-6 schools in the District on the effectiveness indices had composite ranks between 3 and 107 when ranked based on absolute achievement levels. It should be noted that the six schools that ranked in the top fifteen in the District on the *TAAS*, when no known non-school sources of variation were accounted for, were at least 50% White and had no deprivation index above 40.

At the 7-8 level, the most effective schools had enrollments varying from 367 to 888 and were from 7.0% to 30.3% White, 16.3 to 75.4% Black, and 15.7% to 63.2% Hispanic. Deprivation indices varied from a low of 30 to a high of 85 and percent limited-English-proficient varied from 0 to 31.2%. Ranks on the effectiveness indices and the *TAAS* were closer at this level than at K-6. Part of the reason for this is that District middle schools do not differ as much demographically as do District elementary schools.

At the high school level, magnet schools dominated the rankings. Four of the top six schools were magnet schools. This finding was predictable since, at this level, magnet schools spend about twice as much per student as do comprehensive high schools. Notice, however, that the most effective high school in the District, a school that is 97.9% Black, and had a deprivation index of 32, was only ranked 16th out of 28 high schools on the *TAAS*. (For a detailed discussion of the original school effectiveness methodology see Webster, Mendro, and Almaguer, 1994.)

School effectiveness indices are about fairness. Schools have no control over the students that they receive. They should be held accountable for educating effectively the

students that they do receive. Effective schools are good schools. Good schools are schools that effectively improve their students' performance.

Scheerens (1993), in his paper dealing with a research agenda for investigations into basic school effectiveness research, lists four items for that agenda. Those items are:

1. the study and applications of methodologies for the justification of educational goals;

2. quality assessment and (perhaps) enlarging the available instruments for measuring other than the more traditional school effectiveness criteria;

3. comparative studies with respect to the question of whether schools that are strong in traditional cognitive effectiveness criteria are also strong in achieving non-cognitive outcomes (e.g., school well being); and

4. studies that compare different adjustment procedures to determine "net" effects of schooling.

This paper addresses agenda item four. Other studies related to agenda items two and three are ongoing in the DISD and will be reported through other publications.

Method

For the past three years, the DISD has used a series of regression equations to identify effective schools. This has been accomplished through a two stage procedure utilizing multiple performance indicators.[2] This paper examines the similarities and differences between the regression-based model used by the DISD for the past three years and a number of models

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2 Performance indicators for 1993-94 included *Iowa Tests of Basic Skills* and *Tests of Achievement and Proficiency* reading and mathematics, grades 1-9; *Spanish Assessment of Basic Education*, grades 1-6; *Texas Assessment of Academic Skills* reading and mathematics, grades 3-8 and 10; writing, grades 4, 8, and 10; science and social studies, grades 4 and 8; 72 standardized final examinations in language, mathematics, social studies, science, ESOL, reading, and world languages, grades 9-12; promotion rate, grades 1-8; student attendance, grades 1-12; graduation rate, grades 9-12; *Scholastic Aptitude Test* percent tested and scores, grades 9-12; dropout rate, grades 7-12; student enrollment in accelerated courses, grades 7-12; student enrollment in advanced diploma plans, grades 9-12; and *Preliminary Scholastic Test* percent tested and scores, grades 9-12. The system is run with only continuously enrolled students and includes staff attendance incentives, minimum percent eligible tested requirements, and requirements that at least one-half of a school's cohorts must outgrow the national norm group on the *ITBS* and *TAP* in reading and mathematics.

utilizing two-level hierarchical linear modeling. In order to allow for comparison and discussion the predictor and criterion variables are limited to grade 4 *Iowa Tests of Basic Skills (ITBS)* reading and mathematics for 1993 and 1994. [3]

First Regression and Prediction Stage

In the first regression and prediction stage, each predictor and outcome variable was regressed on a combined ethnicity/language proficiency variable, gender, and free and reduced lunch status and the first and second order interactions of these variables. In addition, student mobility and an overcrowdedness statistic as well as block level family income, family educational level, and family poverty index were added to each individual student record with all analyses performed at the student level. For computing the individual difference scores (residuals) in the first stage, let:

Y_{mgi} = the outcome variable of interest for each individual *i* at grade level *g* on measure *m* (in this paper the Y_{mgi}'s are *ITBS* Math 1993, *ITBS* Math 1994, *ITBS* Reading 1993, *ITBS* Math 1994, and the grade (g) is grade 4)

X_{1mgi} = black English Proficient status (1 if black, 0 otherwise)

X_{2mgi} = Hispanic English Proficient status (1 if English Proficient Hispanic, 0 otherwise)

X_{3mgi} = LEP status (1 if Limited English Proficient, 0 otherwise)

X_{4mgi} = gender status (1 if male, 0 otherwise)

X_{5mgi} = free or reduced lunch status (1 if subsidized lunch, 0 otherwise)

X_{6mgi} = school mobility rate

X_{7mgi} = school overcrowdedness index

X_{8mgi} = block average family income

X_{9mgi} = block average family education level

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3 The authors also tested a regression model using only aggregated variables with the school being the unit of analysis (Mendro and Webster, 1993). This approach suffers from the elimination of too much information which produces little variance among schools and, not surprisingly, produces very different ranks than either the regression models discussed in this paper or HLM.

X_{10mgi} = block average family poverty index

Then the expected 1994 level on each measure was given by the linear function:

$$\hat{Y}_{mgi} = f_t(X_{1mgi}, X_{2mgi}, X_{3mgi}, X_{4mgi}, X_{5mgi}, X_{6mgi}, X_{7mgi}, X_{8mgi}, X_{9mgi}, X_{10mgi}, X_{1mgi}X_{4mgi}, X_{2mgi}X_{4mgi}, X_{3mgi}X_{4mgi}, X_{1mgi}X_{5mgi}, X_{2mgi}X_{5mgi}, X_{3mgi}X_{5mgi}, X_{4mgi}X_{5mgi}, X_{1mgi}X_{4mgi}X_{5mgi}, X_{2mgi}X_{4mgi}X_{5mgi}, X_{3mgi}X_{4mgi}X_{5mgi})$$

Where the function f_t, was the prediction equation corresponding to the appropriate grade level, measure, and outcome (t) classification. The equations appear as follows:

$$Y_{mgi} = b_0 + b_1X_{1mgi} + b_2X_{2mgi} + b_3X_{3mgi} + b_4X_{4mgi} + b_5X_{5mgi} + b_6X_{6mgi} + b_7X_{7mgi} + b_8X_{8mgi} + b_9X_{9mgi} + b_{10}X_{10mgi} + b_{11}X_{1mgi}X_{4mgi} + b_{12}X_{2mgi}X_{4mgi} + b_{13}X_{3mgi}X_{4mgi} + b_{14}X_{1mgi}X_{5mgi} + b_{15}X_{2mgi}X_{5mgi} + b_{16}X_{3mgi}X_{5mgi} + b_{17}X_{4mgi}X_{5mgi} + b_{18}X_{1mgi}X_{4mgi}X_{5mgi} + b_{19}X_{2mgi}X_{4mgi}X_{5mgi} + b_{20}X_{3mgi}X_{4mgi}X_{5mgi} + e$$

Where:

Y_{mgi} = predicted criterion or predictor variable for each individual *i* at grade level *g* on measure *m*

b_0 = a constant intercept

b_1 = black English proficient status

b_2 = Hispanic English proficient status (HEP)

b_3 = Limited English Proficient status (LEP)

b_4 = gender status

b_5 = free/reduced lunch status (FRL)

b_6 = school mobility rate

b_7 = school overcrowdedness

b_8 = average family income

b_9 = average family education

b_{10} = average family poverty index

b_{11} = black/gender interaction status

b_{12} = HEP/gender interaction status

b_{13} = LEP/gender interaction status

b_{14} = black/FRL interaction status

b_{15} = HEP/FRL interaction status

b_{16} = LEP/FRL interaction status

b_{17} = gender/FRL interaction status

b_{18} = black/gender/FRL interaction status

b_{19} = HEP/gender/FRL interaction status

b_{20} = LEP/gender/FRL interaction status

e = error

It should be noted that other students (non-black, non-LEP, non-HEP) were not explicitly included in the first-stage equations since they formed the referent against the other ethnic/language students to avoid singularity of the regression design matrix.

From these equations two predicted scores, $\hat{Y}_{1mgi}$ in reading and $\hat{Y}_{mmgi}$ in mathematics for 1994, were computed for every student. Also, predicted scores $\hat{X}_{1mgi}$ and $\hat{X}_{mmgi}$ were computed for 1993 reading and mathematics.

Individual scores were then computed as $d_{cmgi} = Y_{mgi} - \hat{Y}_{mgi}$ for criterion scores, Y_{1mgi} and Y_{mmgi}, and $d_{pmgi} = X_{mgi} - \hat{X}_{mgi}$ for predictor scores, X_{1mgi} and X_{mmgi} on each predictor and criterion variable. These residuals were then standardized and used in the second stage of the equations. Because of limitations relative to the number of variables in the hierarchical linear model equations (HLM), this first stage was used as a precursor to both the regression and HLM models discussed in this paper. (For a complete discussion of this issue see Mendro, et.al., 1995.)

Second Regression and Prediction Stage

In the second stage of the regression study, the outcome residuals (d_{mgi}) computed during Stage 1 were regressed on the residualized predictor variables. Thus residuals of the predictor variables were used to predict residuals of the outcome variables. In all cases, the prior level of the outcome variable was the most significant predictor of the outcome variable. The equations appeared as follows:

$$Y_{rmgi} = b_0+b_1X_{r1mgi}+b_2X_{rnmgi}+e$$

Where:

Y_{rmgi} = predicted outcome variables (residuals) for each individual *i* at grade level *g* on measure *m*. All $\hat{Y}_r$'s and $\hat{X}_r$,s in this stage were residuals computed in the First Regression and Prediction Stage. Variables were *ITBS* math and *ITBS* reading, 1994.

b_0 = constant

b_1 = first predictor variable into the equation (residuals) (either 1993 reading or math)

b2 = second predictor variable into the equation (residuals) (either 1993 reading or math)

e = error

The next step of the second stage of the regression study was to compute residuals (d_{rmgi}) from the regression equations. Raw residuals were computed using the following equation:

$$d_{rmgi} = Y_{rmgi} - \hat{Y}_{rmgi}$$

After raw residuals were computed, the predictor space was divided into 256 equal intervals. For each interval *p*, the mean and standard deviation of the raw residuals was computed. Each raw residual was then standardized by subtracting the mean for the interval and

dividing by the standard deviation of the interval. Expressed as an equation, the standardized residuals were:

$$d_{rpmgi} = (d_{rpmgi} - \bar{d}_{rpmg})/sd_{rpmg}$$

Where:

d_{rpmgi} = the standardized residual for individual *i* in grade *g* on measure *m* in interval *p*

$\bar{d}_{rpmg}$ = the mean residual at grade *g* on measure *m* in interval *p*

sd_{rpmg} = the standard deviation of the residuals at grade *g* on measure *m* in interval *p*.

In this study, d_{rpmgi} was the basic statistic used in ranking schools. Mean residuals for each school on math and reading were computed by associating each d_{rpmgi} with a school and aggregating. In order to obtain rankings reflecting weighting of variables by sample size, the mean residuals were standardized by subtracting the district mean residual (approximately 0 after the standardization within intervals), dividing by the district standard deviation of residuals (approximately 1), and multiplying by the square root of *n* for each school on measure *m* at grade *g*. The mean deviations were then converted to a T score with a mean of 50 and a standard deviation of 10.

Hierarchical Linear Models

Hierarchical linear modeling (HLM) estimates linear equations that explain outcomes for group members as a function of the characteristics of the group as well as the characteristics of the members. Because HLM involves the prediction of outcomes of members who are nested within groups which in turn may be nested in larger groups, the technique should be well suited for use in education. The nested structure of students within classrooms and classrooms within schools produces a different variance at each level for factors measured at that level. While the current Dallas regression models use only student-level variables in prediction, it is probable that the error terms can be improved through the use of HLM. Bryk, et. al. (1988) cited four advantages of HLM over regular linear models. First, HLM can explain student outcomes and growth as a function of school-level or classroom-level characteristics while taking into account the variance of student outcomes within schools. Second, it can model the effects of student

background variables such as gender, ethnicity, limited-English proficient status, and socioeconomic status on outcomes within schools or classrooms and explain differences in these effects between schools or classrooms using school or classroom characteristics. In actuality, when modeling relationships at the school or classroom level where sample sizes are restricted and matrices are not generally of large rank, HLM analysis will not accommodate the large array of variables necessary to model complex relationships between student outcomes and context variables that include necessary interactions. Third, HLM can model the between-and within-school variance simultaneously and thus produce better estimates of student outcomes. Finally, it can produce better estimates of the predictors of student outcome within classrooms by using information about these relationships gained from other schools and classrooms. HLM models are discussed in the literature under a number of different titles by different authors from a number of diverse disciplines (Bryk and Raudenbush, 1992; Dempster, Rubin and Tsutakawa, 1981; Elson and Grizzle, 1962; Goldstein, 1987; Henderson, 1984; Laird and Ware, 1982; Longford, 1987; Mason, Wong, and Entwistle, 1984; Rosenberg, 1973).

Because of limitations in the number of variables that can be used in HLM due to the small n's in some schools, and the high correlations among the background variables, the methodology described in the First Regression and Prediction Stage was utilized so that HLM was actually run on residuals. The first step in using HLM involves centering the data. The data may be centered around a grand mean or around individual school means. In this study data were centered around the grand mean. If data are not centered, severe problems with multicolinearity are encountered and the HLM program cannot invert many of the matrices associated with individual schools.

The equations involved in two-level HLM are as follows:

Level 1: $Y_{rjmgi} = B_{0j} + B_{1j}X_1 + B_{2j}X_2 + r_{rjmgi}$ (one equation for each school)

Y_{rjmgi} = predicted outcome variable (residuals) for each individual *i* at grade level *g* (grade 4) on measure *m* (1994 *ITBS* reading or math) in school j

B_0 = constant

B1 = first predictor variable into the equation (either 1993 reading or math)

B_2 = second predictor variable into the equation (either 1993 reading or math)

r_{0jmgi} = a level one random effect corresponding to the prediction of $\hat{Y}_{rmgi}$.

Level 2: $B_{oj} = \gamma_{00} + \gamma_{01}W_j + u_{oj}$

$B_{1j} = \gamma_{10} + \gamma_{11}W_j + u_{ij}$

Where: B_{0j} = individual school intercept

γ_{00} = level 2 coefficient corresponding to mean γ intercept of all schools

$\gamma_{01}W_j$ = level 2 predictors (will be overcrowding, mobility, and percent on free or reduced lunch average income, average poverty index, average parental education, percent minority, percent Black, percent Hispanic, and limited English proficiency status). γ_{01} is the regression coefficient for predicting the school intercept from the conditioning variable(s)

u_{0j} = level 2 random effects

B_{ij} = individual school slope

γ_{10} = level 2 coefficient corresponding to the average slope of all schools

$\gamma_{11}W_j$ = level 2 predictors. γ_{11} is the regression coefficient for predicting the school slope from the conditioning variable(s)

u_{ij} = level 2 random effects

The HLM procedure estimates the initial levels of the expectations and variances of the beta's and the tau's and uses an empirical Bayes method to arrive at a solution. The school level residuals around the empirical Bayes estimates of the school intercepts are then used to produce school ranks.

This paper examined eleven different HLM models. The first, HLM-FULL, examined the use of Level 1 variables *ITBS* reading residuals and *ITBS* math residuals 1993 to predict *ITBS* reading residuals 1994 and to predict *ITBS* math residuals 1994. No second level conditioning variables were used.

The second, HLM-MC, took mobility and overcrowdedness (X_{6mgi} and X_{7mgi}) out of the first regression and prediction stage and used them as conditioning variables in the second HLM stage. The third, HLM-MCL, took overcrowdedness, mobility, and free or reduced lunch and all of its interactions out of the first regression and prediction stage and used them as conditioning variables in the second HLM stage (X_{5mgi}, X_{6mgi}, X_{7mgi}, $X_{1mgi}X_{5mgi}$, $X_{2mgi}X_{5mgi}$, $X_{3mgi}X_{5mgi}$, $X_{4mgi}X_{5mgi}$, $X_{1mgi}X_{4mgi}X_{5mgi}$, $X_{2mgi}X_{4mgi}X_{5mgi}$, $X_{3mgi}X_{4mgi}X_{5mgi}$). The fourth, HLM-MCC01, put free or reduced lunch and all its interactions back in at the first regression and prediction stage, took average family income, average family education level, and average family poverty index out of the first regression and prediction stage, and used average family income, average family education level, and average family poverty index as second level conditioning variables. Thus X_{8mgi}, X_{9mgi}, and X_{10mgi} were out of the first stage leaving the first stage equation the same as that at the top of page 10 with the exception of b_8X_{8mgi}, b_9X_{9mgi}, and $b_{10}X_{10mgi}$. The fifth, HLM-MCC02, added percent free and reduced lunch as a second level conditioning variable while leaving it in at the student level in the first stage equations. The sixth, HLM-MCC03, added school percent minority as a second level conditioning variable. The seventh, HLM-MCC04, added school percent Black and school percent Hispanic as second level conditioning variables. The eighth, HLM-MCC05, added school percent limited English proficient as a second level conditioning variable.

In addition to the aforementioned models additional HLM models were examined that used two years of historical achievement data to predict current achievement. We abandoned using a longitudinal model in the actual system because of severe subject mortality (about 10% in year n-2, about 25% in year n-3.) The equations would be the same as those on pages 14 and 15 except that B_1 would be reading and/or math in 1993 and B_2 would be reading and/or math in 1992. These models, HLM-L and HLM-LB, use no second level conditioning variables.

Equations were calculated predicting reading and/or math from two years of reading or math, respectively (HLM-L), and from two years of reading and math (HLM-LB) After viewing the results produced by these models, the same second level conditioning variables were added as were used in HLM-MCC05 to produce a new model, HLM-LC

Finally, in order to aid in comparison, the original Dallas model was computed (DALLAS-FULL) and additional models were run taking mobility and overcrowdedness out of the first regression and prediction stage (DALLAS-MC), and taking mobility, overcrowdedness, and free or reduced lunch status out of the first regression and prediction stage (DALLAS-MCL). Finally, for all of those school districts and state departments of education that are ranking or accrediting schools based on simple gain scores or absolute test score levels, GAIN and NCE were included to compare their output to that of the various mathematical models tried in this paper.

Table 2 shows the descriptors used in the remainder of the paper for each of the models, the first regression and prediction stage predictors, the second regression and prediction stage predictors, and the second level conditioning variables used in each of the HLM models. The criterion variables for models 1 through 11 were 1994 reading or 1994 mathematics residuals as computed in the first regression and prediction stage. All initial test scores were NCE's. Models 12 through 16, HLM-L, HLM-LB, HLM-LC, GAIN, and NCE used reading or mathematics NCE's as the criterion variables since a first regression and prediction stage was not used with these models.

The perceptive reader might ask why such a large array of context and conditioning variables were used instead of using a technique which only adds variables that add significantly to prediction. The context and conditioning variables were determined by the Accountability Task Force and were there because the Task Force believed, and more importantly, the field believed that they are factors that impact the education of students that are not under the control of the schools. The school level models allow the luxury of including a large number of context and conditioning variables. For a discussion of the results produced by statistically selected models see Mendro, et. al. (1995).

TABLE 2
VARIOUS MODELS USED
IN COMPARISONS

Numbers	Model Descriptor	First Stage Predictors	Second Stage Predictors	Conditioning Variables
1	DALLAS-FULL	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, school mobility rate, school overcrowdedness, block average family income, block average family education level, block average family poverty index, Black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, Black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, Black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	None
2	HLM-FULL	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, school mobility rate, school overcrowdedness, block average family income, block average family education level, block average family poverty index, Black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, Black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, Black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	None

TABLE 2
VARIOUS MODELS USED IN COMPARISONS

Numbers	Model Descriptor	First Stage Predictors	Second Stage Predictors	Conditioning Variables
3	DALLAS-MC	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, block average family income, block average family education level, block average family poverty index, black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	None
4	HLM-MC	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, block average family income, block average family education level, block average family poverty index, black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	School mobility rate/school overcrowdedness

TABLE 2
VARIOUS MODELS USED
IN COMPARISONS

Numbers	Model Descriptor	First Stage Predictors	Second Stage Predictors	Conditioning Variables
5	DALLAS-MCL	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, block average family income, block average family education level, block average family poverty index, black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	None
6	HLM-MCL	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, block average family income, block average family education level, block average family poverty index, black/gender interaction status, Hispanic English proficient/ gender interaction status, limited English proficient/gender interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	School mobility rate/school overcrowdedness/ percent students on free or reduced lunch.

TABLE 2
VARIOUS MODELS USED
IN COMPARISONS

Numbers	Model Descriptor	First Stage Predictors	Second Stage Predictors	Conditioning Variables
7	HLM-MCC 01	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	School mobility rate/school overcrowdedness/ school average family income, education level, and poverty index.
8	HLM-MCC 02	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	School mobility rate/school overcrowdedness/ school average family income, education level, poverty index, and school percent free or reduced lunch.

TABLE 2
VARIOUS MODELS USED
IN COMPARISONS

Numbers	Model Descriptor	First Stage Predictors	Second Stage Predictors	Conditioning Variables
9	HLM-MCC 03	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	School mobility rate/school overcrowdedness/ school average family income, education level, poverty index, school percent free or reduced lunch, and school percent minority.
10	HLM-MCC 04	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	School mobility rate/school overcrowdedness/ school average family income, education level, poverty index, school percent free or reduced lunch, school percent minority, school percent Black, and school percent Hispanic.

TABLE 2
VARIOUS MODELS USED
IN COMPARISONS

Numbers	Model Descriptor	First Stage Predictors	Second Stage Predictors	Conditioning Variables
11	HLM-MCC 05	Black English proficient status, Hispanic English proficient status, limited English proficient status, gender status, free/reduced lunch status, black/gender interaction status, Hispanic English proficient/gender interaction status, limited English proficient/gender interaction status, black/free or reduced lunch interaction status, Hispanic English proficient/free or reduced lunch interaction status, limited English proficient/free or reduced lunch interaction status, gender/free or reduced lunch interaction status, black/gender/free or reduced lunch interaction status, Hispanic English proficient/gender/free or reduced lunch interaction status, limited English proficient/gender/free or reduced lunch interaction status.	1993 reading residuals from first stage 1993 mathematics residuals from first stage	School mobility rate/school overcrowdedness/ school average family income, education level, poverty index, school percent free or reduced lunch, school percent minority, school percent Black, school percent Hispanic, and school percent limited English proficient.
12	HLM-L	None	1992 and 1993 reading NCE's or 1992 and 1993 mathematics NCE's.	None
13	HLM-LB	None	1992 and 1993 Reading NCE's; 1992 and 1993 mathematics NCE's.	None

TABLE 2
VARIOUS MODELS USED
IN COMPARISONS

Numbers	Model Descriptor	First Stage Predictors	Second Stage Predictors	Conditioning Variables
14	HLM-LC	None	1992 and 1993 reading NCE's or 1992 and 1993 mathematics NCE's	School mobility rate/school overcrowdedness/ school average family income, education level, poverty index, school percent free or reduced lunch, school percent minority, school percent Black, school percent Hispanic, and school percent limited English proficient.
15	GAIN	None	None. Base year was 1993 reading or mathematics NCE's. Simple gain calculated.	None
16	NCE	None	None. Schools were ranked based on 1994 NCE's only.	None

Results

All residuals produced by all models are reported in terms of T scores (mean of 50, standard deviation of 10). Since the major objective of this exercise was to define effective schools by controlling for factors over which the schools have no control and then determining which schools made the greatest improvement, the degree of consistency among the models is of major interest. While it is obvious that different context and conditioning variables will produce different results, it was hypothesized that carefully thought out statistical models utilizing the same context and/or conditioning variables would produce very similar results. Specifically, we were initially interested in the consistency of results between the original Dallas models that rely on interactions to insure fairness and two-level HLM models that use similar context variables and add additional conditioning variables at the school level.

Table 3 presents the correlations for reading between the various models and methods that are specified in Table 2. The correlation between the results produced by DALLAS-FULL and HLM-FULL, two comparable models, was .970. The correlation between the results produced by DALLAS-MC and HLM-MC, two semi-comparable models, was .949. The correlation between the results produced by DALLAS-MCL and HLM-MCL was .950. Thus it can be said that the two approaches, one regression-based using first and second order interactions, and one HLM, using two levels of equations, produced very similar results. We would have liked to try entering all of the context variables and their interactions from the first regression and prediction stage into the first level of HLM, but we couldn't invert the matrices (probably due to multicolinearity). If we had just utilized HLM without the full complement of context variables available in DALLAS-FULL, we would not have had an appropriate comparison.

After determining that the two methodological approaches produced very similar results, we investigated other models as specified in Table 2. The correlations between DALLAS-FULL and the various HLM models dropped (to a low of .895) as additional conditioning variables were added to HLM. Thus, even in the worst case where HLM-MCC05 had much more information than DALLAS-FULL, eighty percent of the variation between results produced by the two models was accounted for. (The correlation between the results produced by HLM-FULL and HLM-MCC05 was .914, only .019 different from the correlation between DALLAS-FULL and HLM-MCC05.)

TABLE 3

Correlation Matrix Between READING Models

	DALLAS-FULL	HLM-FULL	DALLAS-MC	HLM-MC	DALLAS-MCL	HLM-MCL	HLM-MCC 01	HLM-MCC 02
DALLAS-FULL	1.000							
HLM-FULL	0.970	1.000						
DALLAS-MC	0.929	0.890	1.000					
HLM-MC	0.927	0.946	0.949	1.000				
DALLAS-MCL	0.934	0.909	0.936	0.910	1.000			
HLM-MCL	0.909	0.927	0.881	0.918	0.950	1.000		
HLM-MCC 01	0.919	0.936	0.888	0.912	0.915	0.940	1.000	
HLM-MCC 02	0.918	0.937	0.887	0.913	0.914	0.941	0.999	1.000
HLM-MCC 03	0.908	0.927	0.881	0.909	0.911	0.938	0.992	0.992
HLM-MCC 04	0.895	0.913	0.871	0.897	0.901	0.927	0.985	0.985
HLM-MCC 05	0.895	0.914	0.869	0.898	0.901	0.927	0.984	0.984
HLM-L	0.773	0.798	0.738	0.755	0.738	0.736	0.794	0.794
HLM-LB	0.793	0.819	0.768	0.785	0.773	0.763	0.829	0.829
HLM-LC	0.789	0.803	0.748	0.778	0.764	0.790	0.853	0.853
GAINS	0.731	0.732	0.740	0.720	0.749	0.737	0.803	0.801
NCE	0.443	0.508	0.374	0.462	0.389	0.384	0.360	0.366

TABLE 3 (CONT.)

Correlation Matrix Between READING Models

	HLM-MCC 03	HLM-MCC 04	HLM-MCC 05	HLM-L	HLM-LB	HLM-LC	GAINS	NCE
DALLAS-FULL								
HLM-FULL								
DALLAS-MC								
HLM-MC								
DALLAS-MCL								
HLM-MCL								
HLM-MCC 01								
HLM-MCC 02								
HLM-MCC 03	1.000							
HLM-MCC 04	0.993	1.000						
HLM-MCC 05	0.992	0.999	1.000					
HLM-L	0.763	0.734	0.733	1.000				
HLM-LB	0.800	0.778	0.775	0.979	1.000			
HLM-LC	0.859	0.864	0.866	0.829	0.830	1.000		
GAINS	0.775	0.755	0.755	0.796	0.812	0.681	1.000	
NCE	0.339	0.323	0.325	0.558	0.487	0.365	0.245	1.000

The series of HLM models that utilized two years of prediction but did not include context variables produced somewhat different results. Correlations between the results produced by HLM-L and HLM-LB and most of the DALLAS and HLM models were generally in the high seventies. Correlations ranged from .733 between HLM-L and HLM-MCC05 to .829 between HLM-LB and HLM-MCC01 and HLM-MCC02. Adding the full array of context variables at the second level produced somewhat higher correlations with the various hybrid HLM models (HLM-MCC01 through HLM-MCC05).

Finally, the reader is encouraged to examine the correlations between the various models and GAINS and NCE, two of the most utilized methods of comparing schools. At best, the results produced by GAINS accounted for only 65% of the variance in any of the models and the results produced by NCE for only 36%.

Table 4 presents the correlation matrix for mathematics. The relationships are similar to those reported for reading except that the correlations are much higher. DALLAS-FULL correlated .976 with HLM-FULL; DALLAS-MC correlated .972 with HLM-MC; and, DALLAS-MCL correlated .973 with HLM-MCL. All of the correlations between the DALLAS models and the HLM models through HLM-MCC05 were above .90. Even the correlations between HLM-L, HLM-LB, HLM-LC and the other models were in the high eighties, reaching a high of .935 between HLM-LC and HLM-MCC05. Correlations with GAINS ranged from .836 with DALLAS-MCL to .875 with HLM-MCC04. Correlations with NCE were all in the range of .525 to .595. Thus, the best case scenario had NCE accounting for about 35% of the variance in the results produced by HLM-MC.

Remembering that the major objective of this methodology was to assure fairness in comparing the products of schools, one important consideration is that of whether or not individual student background characteristics were related to results. Tables 5 and 6 present correlations between the residuals produced by each of the models and each of the important student background variables.

Table 5 displays the aforementioned correlations for reading. Correlations with most models were minimal, accounting for less than .0004% of the variance. HLM-L and HLM-LB produced somewhat higher, although not practically significant, correlations with Black students (-.1390 and -.1267) while HLM-LC reduced that correlation to .0627. GAINS correlated -.1127 with Black student status while NCE correlated -.1546 with Black student status, .2568 with Other student status, -.1776 with LEP status, and .2483 with lunch status (o=free or reduced

TABLE 4

Correlation Matrix Between MATH Models

	DALLAS-FULL	HLM-FULL	DALLAS-MC	HLM-MC	DALLAS-MCL	HLM-MCL	HLM-MCC 01	HLM-MCC 02
DALLAS-FULL	1.000							
HLM-FULL	0.976	1.000						
DALLAS-MC	0.960	0.938	1.000					
HLM-MC	0.948	0.958	0.972	1.000				
DALLAS-MCL	0.947	0.928	0.948	0.929	1.000			
HLM-MCL	0.939	0.943	0.937	0.949	0.973	1.000		
HLM-MCC 01	0.946	0.958	0.937	0.953	0.929	0.941	1.000	
HLM-MCC 02	0.944	0.957	0.936	0.954	0.930	0.944	0.999	1.000
HLM-MCC 03	0.938	0.953	0.931	0.949	0.926	0.944	0.994	0.995
HLM-MCC 04	0.936	0.951	0.928	0.947	0.921	0.939	0.992	0.993
HLM-MCC 05	0.930	0.948	0.923	0.942	0.913	0.930	0.987	0.987
HLM-L	0.885	0.892	0.903	0.906	0.883	0.884	0.910	0.909
HLM-LB	0.886	0.891	0.906	0.904	0.883	0.883	0.909	0.908
HLM-LC	0.873	0.886	0.872	0.884	0.860	0.876	0.925	0.925
GAINS	0.845	0.839	0.866	0.857	0.836	0.836	0.883	0.880
NCE	0.560	0.598	0.525	0.595	0.576	0.584	0.563	0.565

TABLE 4 (CONT.)

Correlation Matrix Between MATH Models

	HLM-MCC 03	HLM-MCC 04	HLM-MCC 05	HLM-L	HLM-LB	HLM-LC	GAINS	NCE
DALLAS-FULL								
HLM-FULL								
DALLAS-MC								
HLM-MC								
DALLAS-MCL								
HLM-MCL								
HLM-MCC 01								
HLM-MCC 02								
HLM-MCC 03	1.000							
HLM-MCC 04	0.997	1.000						
HLM-MCC 05	0.992	0.994	1.000					
HLM-L	0.904	0.905	0.902	1.000				
HLM-LB	0.903	0.905	0.901	0.997	1.000			
HLM-LC	0.929	0.929	0.935	0.965	0.961	1.000		
GAINS	0.874	0.875	0.874	0.891	0.893	0.868	1.000	
NCE	0.549	0.554	0.543	0.544	0.526	0.521	0.270	1.000

TABLE 5

Correlations of READING Models Residuals & Student Characteristics

	DALLAS-FULL	HLM-FULL	DALLAS-MC	HLM-MC	DALLAS-MCL	HLM-MCL	DALLAS-MCC	HLM-MCC 01	HLM-L	HLM-LB	HLM-LC	GAINS	NCE
Other	0.0100	-0.0037	0.0202	-0.0171	0.0220	-0.0235	0.0050	-0.0156	0.0615	0.0564	-0.0150	0.0103	0.2568
Black	-0.0109	0.0016	-0.0170	0.0099	-0.0170	-0.0053	-0.0060	-0.0008	-0.1390	-0.1267	0.0627	-0.1127	-0.1546
Hispanic	0.0029	0.0021	0.0050	-0.0006	-0.0040	0.0165	0.0010	0.0165	0.0954	0.0879	-0.0710	0.0700	0.1085
Lep	0.0012	-0.0006	-0.0040	0.0050	0.0050	-0.0009	0.0020	0.0092	0.0232	0.0196	0.0077	0.0693	-0.1776
Gender	0.0066	0.0054	-0.0070	-0.0098	0.0210	0.0107	-0.0030	-0.0013	0.0668	0.0771	-0.0677	0.0397	0.0099
Lunch	-0.0087	-0.0041	-0.0080	-0.0034	0.0120	0.0133	0.0030	-0.0187	0.0436	0.0421	-0.0183	-0.0188	0.2483

lunch, 1=non-free or reduced lunch). Only the correlations between NCE and other student and lunch status are practically significant, accounting for more than 5% of the variance. Mathematics results, shown in Table 6, were similar with generally lower correlations than reading. Thus, when analyzed at the individual student level, correlations with student background variables were generally acceptable with only the NCE model producing results that accounted for more than 2% of the variance.

The next important concern is whether or not school context characteristics are related to the rankings produced by the various models. Table 7 shows the appropriate correlations for reading. Several results reported in Table 7 are of interest. First, all of the DALLAS and HLM models through HLM-MCC05 produced minimal correlations with school context variables, the highest proportion of variance in rankings accounted for by any of these models being less than 3%. Second, when conditioning variables were introduced at the second level in HLM the correlations with those school context variables were adjusted to 0. Third, HLM-L and HLM-LB produced unacceptable correlations (accounting for more than 5% of the variance) with percent minority (-357, -.34), percent Black (-.455, -.423), percent Hispanic (.293, .271), percent LEP (.269, .255) and average percent poverty (-.293, -.287). These correlations were eliminated when those variables were introduced as second level conditioning variables (HLM-LC). Fourth, GAINS produced unacceptable correlations with percent Black (-.334), percent Hispanic (.256), and percent minority (-.228). Finally, NCE produced unacceptable correlations with parental college education (.648), average income (.605), percent free/reduced lunch (-.594), percent minority (-.587), average percent poverty (-.496), and percent Black (-.302).

Table 8 shows the correlation matrix for mathematics. Most of the same relationships held except that HLM-L, HLM-LB, and GAINS did not produce unacceptable correlations. NCE produced unacceptable correlations with parental education level (.503), percent free lunch (-.481), percent minority (-.427), average family income (.417), average percent poverty (-.325) and percent LEP (-.230).

Summary and Discussion

What does all this mean? The purpose for which these various models were used was to rank schools. The important consideration in this context is the extent to which ranks changed due to the use of different models. Specifically, the original intent of the paper was to determine the differences in results produced by a regression model using first and second order interactions and a two-level HLM Model. The differences in the rankings produced by these two

TABLE 6

Correlations of MATH Models Residuals & Student Characteristics

	DALLAS-FULL	HLM-FULL	DALLAS-MC	HLM-MC	DALLAS-MCL	HLM-MCL	DALLAS-MCC	HLM-MCC 01	HLM-L	HLM-LB	S-R-R23 ALL L2	GAINS	NCE
Other	0 0002	-0 0129	0 0110	-0 0301	0 0110	-0 0331	0 0006	-0 0151	-0 0169	-0 0305	0 0141	-0 0040	0 4508
Black	0 0023	-0 0292	-0 0080	-0 0279	-0 0010	-0 0336	-0 0090	-0 0481	-0 0670	-0 0706	0 0670	0 0268	0 6178
Hispanic	0 0000	-0 0139	0 0010	-0 0096	-0 0110	0 0020	0 0030	0 0055	-0 0050	-0 0071	-0 0119	0 0081	0 4414
Lep	-0 0035	-0 0034	-0 0023	-0 0039	0 0020	-0 0109	0 0090	-0 0197	0 0115	0 0233	-0 0215	0 0822	0 3170
Gender	-0 0041	-0 0312	-0 0100	-0 0040	0 0030	-0 0356	0 0020	-0 0365	-0 0308	-0 0380	0 0196	0 0077	0 8920
Lunch	-0 0003	-0 0031	-0 0180	-0 0399	0 0040	-0 0383	0 0050	-0 0371	-0 0476	-0 0572	0 0349	-0 0195	0 9040

TABLE 7

Correlations of READING Models & Level-2 Conditioning Variables

	DALLAS-FULL	HLM-FULL	DALLAS-MC	HLM-MC	DALLAS-MCL	HLM-MCL	HLM-MCC 01	HLM-MCC 02
%AYT-94	-0.064	-0.066	0.084	0.000	0.066	0.000	0.000	0.000
%FREELUNCH	-0.107	-0.141	-0.052	-0.125	-0.079	0.000	-0.003	0.000
%MINORITY	-0.140	-0.169	-0.116	-0.135	-0.118	-0.053	-0.084	-0.087
% BLACK	-0.098	-0.124	-0.073	-0.064	-0.074	-0.092	-0.131	-0.133
% HISPANIC	0.002	0.003	-0.003	-0.046	-0.012	0.045	0.091	0.090
%LEP	-0.004	-0.002	0.010	-0.037	-0.001	0.060	0.089	0.090
% CROWD	-0.055	-0.037	0.071	0.000	0.019	0.000	0.000	0.000
AVG INCOME	0.035	0.076	-0.014	0.031	0.036	-0.013	0.000	0.000
AVG-%-POVERTY	-0.094	-0.133	-0.082	-0.116	-0.091	-0.053	0.000	0.000
AVG-%-COLLEGE	0.089	0.119	0.091	0.118	0.098	0.010	0.000	0.000

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TABLE 7 (CONT.)

Correlations of READING Models & Level-2 Conditioning Variables

	HLM-MCC 03	HLM-MCC 04	HLM-MCC 05	HLM-L	HLM-LB	HLM-LC	GAINS	NCE
%AYT-94	0.000	0.000	0.000	0.057	0.065	0.000	0.081	-0.164
%FREELUNCH	0.000	0.000	0.000	-0.127	-0.107	0.000	-0.006	-0.594
%MINORITY	0.000	0.000	0.000	-0.357	-0.340	0.000	-0.228	-0.587
% BLACK	-0.064	0.000	0.000	-0.455	-0.423	0.000	-0.334	-0.302
% HISPANIC	0.065	0.000	0.000	0.293	0.271	0.000	0.256	-0.095
%LEP	0.072	0.007	0.000	0.269	0.255	0.000	0.209	-0.148
% CROWD	0.000	0.000	0.000	0.168	0.184	0.000	0.157	0.068
AVG INCOME	0.000	0.000	0.000	0.231	0.212	0.000	0.029	0.605
AVG-%-POVERTY	0.000	0.000	0.000	-0.293	-0.287	0.000	-0.125	-0.496
AVG-%-COLLEGE	0.000	0.000	0.000	0.191	0.158	0.000	0.006	0.648

TABLE 8

Correlations of MATH Models & Level-2 Conditioning Variables

	DALLAS-FULL	HLM-FULL	DALLAS-MC	HLM-MC	DALLAS-MCL	HLM-MCL	HLM-MCC 01	HLM-MCC 02
%AYT-94	-0.072	-0.085	0.027	0.000	0.022	0.000	0.000	0.000
%FREELUNCH	-0.054	-0.071	-0.020	-0.047	-0.037	0.000	-0.021	0.000
%MINORITY	-0.076	-0.070	-0.073	-0.090	-0.078	-0.025	-0.083	-0.070
% BLACK	0.027	0.042	0.053	0.011	0.056	0.050	-0.027	-0.031
% HISPANIC	-0.086	-0.104	-0.106	-0.084	-0.125	-0.091	-0.025	-0.015
%LEP	-0.116	-0.125	-0.123	-0.101	-0.142	-0.104	-0.053	-0.039
% CROWD	-0.017	-0.006	-0.052	0.000	-0.087	0.000	0.000	0.000
AVG INCOME	-0.044	-0.026	-0.072	-0.016	-0.026	-0.019	0.000	0.000
AVG-%-POVERTY	-0.024	-0.029	-0.043	-0.080	-0.022	-0.050	0.000	0.000
AVG-%-COLLEGE	-0.001	0.039	-0.026	0.037	0.026	0.022	0.000	0.000

TABLE 8 (CONT.)

Correlations of MATH Models & Level-2 Conditioning Variables

	HLM-MCC 03	HLM-MCC 04	HLM-MCC 05	HLM-L	HLM-LB	HLM-LC	GAINS	NCE
%AYT-94	0.000	0.000	0.000	0.088	0.081	0.000	0.141	-0.128
%FREELUNCH	0.000	0.000	0.000	-0.002	0.027	0.000	0.126	-0.481
%MINORITY	0.000	0.000	0.000	-0.069	-0.042	0.000	-0.007	-0.427
% BLACK	0.026	0.000	0.000	0.028	0.037	0.000	-0.010	-0.130
% HISPANIC	-0.036	0.000	0.000	-0.071	-0.062	0.000	0.029	-0.180
%LEP	-0.054	-0.027	0.000	-0.081	-0.071	0.000	0.024	-0.230
% CROWD	0.000	0.000	0.000	-0.075	-0.083	0.000	-0.019	-0.063
AVG INCOME	0.000	0.000	0.000	-0.084	-0.114	0.000	-0.171	0.417
AVG-%-POVERTY	0.000	0.000	0.000	0.002	0.024	0.000	0.067	-0.325
AVG-%-COLLEGE	0.000	0.000	0.000	0.002	-0.026	0.000	-0.150	0.503

methodologies were minimal. The correlations between the results produced by DALLAS-FULL and HLM-FULL were .97 in reading and .976 in mathematics. For those readers who are gluttons for punishment, Tables 9 through 14 provide T-scores produced by each of the models by school ID, by comparison with DALLAS-FULL, and by rank order within model. As the correlations suggests, rankings produced by the various DALLAS and HLM models are very close. When one considers that schools are classified as .5 s.d. above prediction, within .5 s.d. of prediction, and more than .5 s.d. below prediction, the various reputable models are within one standard error of estimate of subsequent agreement in the ranks that they produce.

The study then expanded as other questions became apparent. First, the most obvious. Ranking schools purely on the basis of absolute test scores is clearly biased against schools with large populations of poor students, large populations of minority students, and large populations of Black students. Using gain scores appears to result in bias to schools with large percentages of Black and minority students.

Using only student test scores to predict performance, even using HLM methodology, produces unacceptable correlations at the school level with percent Black, percent minority, percent Hispanic, percent LEP, and percent poverty. These results replicate those found with basic regression methodology by Webster and Olson (1988). The correlations are not practically significant at the individual student level and the school level correlations can be eliminated by entering appropriate variables at the second level in HLM.

All things considered, it is important that both student level and school level contextual information be included in models for identifying effective schools. While it may be desirable to include this information in the first level of HLM, the authors were unable to enter sufficient numbers of background variables into the HLM models to reflect the complex nature of these inter-related variables. Rather than oversimplify the models to accommodate a small subset of important context variables within the confines of HLM, a preliminary regression stage was utilized to control for the effects of important context variables. This, in conjunction with a two-stage HLM model, produced minimal correlation between residuals and student level context variables and zero correlation between residuals and school level context variables.

TABLE 9
COMPARISON OF READING MODELS
(ARRANGED BY ID NUMBER)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
101	35.309	101	36.645	101	40.954	101	41.341	101	37.885	101	36.691	101	38.337	101	38.421
104	49.009	104	49.380	104	51.560	104	52.558	104	51.359	104	54.672	104	48.106	104	48.093
105	50.236	105	50.080	105	48.414	105	47.782	105	48.666	105	49.976	105	51.858	105	51.990
106	47.619	106	47.764	106	44.173	106	43.589	106	43.783	106	45.193	106	45.495	106	45.858
108	47.206	108	45.224	108	53.069	108	50.577	108	54.754	108	51.451	108	45.727	108	45.738
109	51.198	109	52.121	109	55.898	109	56.203	109	56.483	109	57.917	109	56.454	109	56.286
110	52.129	110	51.422	110	52.925	110	51.153	110	54.840	110	54.728	110	51.907	110	51.668
112	40.487	112	38.846	112	41.534	112	37.704	112	42.744	112	41.050	112	41.159	112	41.050
113	63.447	113	62.569	113	63.736	113	64.145	113	67.887	113	64.904	113	66.027	113	64.795
114	66.574	114	64.329	114	63.521	114	63.819	114	64.352	114	63.414	114	64.739	114	64.669
115	73.640	115	72.778	115	73.743	115	75.029	115	76.032	115	77.444	115	78.042	115	77.866
116	58.193	116	53.456	116	57.998	116	52.906	116	56.242	116	53.390	116	54.160	116	53.469
117	33.247	117	32.857	117	31.314	117	32.402	117	32.246	117	35.137	117	34.782	117	34.714
118	50.148	118	47.684	118	47.138	118	46.606	118	46.438	118	46.699	118	46.438	118	46.965
119	71.729	119	74.416	119	69.128	119	71.502	119	66.418	119	66.226	119	70.694	119	70.640
120	49.242	120	50.570	120	51.570	120	53.623	120	48.703	120	48.574	120	49.078	120	49.089
121	43.353	121	42.908	121	43.979	121	43.981	121	42.827	121	40.513	121	40.554	121	40.496
124	29.494	124	23.297	124	26.449	124	22.782	124	20.482	124	17.429	124	24.512	124	24.614
125	59.401	125	60.289	125	57.974	125	56.359	125	57.488	125	56.515	125	54.188	125	53.932
126	52.024	126	52.035	126	55.040	126	54.695	126	50.715	126	48.406	126	50.746	126	51.408
127	39.756	127	42.331	127	38.537	127	40.513	127	41.374	127	42.572	127	41.187	127	40.993
128	56.010	128	57.994	128	58.829	128	60.921	128	57.844	128	60.329	128	60.952	128	60.751
129	53.604	129	53.730	129	57.397	129	57.475	129	57.298	129	57.204	129	49.324	129	49.292
130	44.152	130	44.437	130	49.541	130	50.547	130	42.303	130	45.858	130	44.812	130	44.547
131	53.776	131	53.997	131	55.053	131	53.519	131	53.902	131	53.686	131	57.686	131	57.723
132	36.740	132	35.123	132	38.317	132	37.415	132	39.336	132	38.686	132	35.134	132	35.120
133	30.132	133	28.903	133	32.037	133	29.548	133	33.908	133	32.332	133	28.363	133	28.231
136	53.463	136	54.964	136	46.632	136	50.170	136	51.554	136	55.777	136	57.602	136	57.513
137	49.275	137	50.613	137	44.000	137	45.667	137	49.175	137	51.755	137	48.817	137	48.689
139	47.616	139	48.269	139	46.901	139	46.547	139	50.190	139	50.096	139	50.971	139	50.960
140	47.421	140	47.619	140	47.897	140	47.841	140	48.480	140	45.369	140	50.591	140	50.623
142	26.775	142	26.335	142	24.633	142	26.117	142	23.571	142	23.214	142	23.358	142	23.114
144	36.419	144	35.137	144	43.290	144	39.293	144	38.595	144	41.899	144	34.493	144	34.588
145	49.502	145	50.339	145	48.526	145	49.845	145	47.435	145	48.518	145	50.176	145	50.147
147	48.346	147	48.507	147	47.099	147	46.133	147	45.489	147	41.491	147	41.546	147	41.386
148	52.553	148	55.108	148	49.695	148	53.653	148	53.175	148	52.572	148	49.296	148	49.327
149	49.687	149	48.882	149	49.611	149	48.972	149	48.592	149	49.560	149	50.338	149	50.189
150	53.098	150	53.774	150	53.743	150	54.200	150	58.722	150	60.745	150	54.786	150	55.137
152	39.025	152	40.231	152	36.835	152	36.247	152	38.926	152	35.049	152	40.765	152	40.685
153	53.524	153	54.185	153	48.131	153	48.824	153	50.074	153	50.337	153	49.958	153	49.691

TABLE 9
COMPARISON OF READING MODELS
(ARRANGED BY ID NUMBER)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
156	59.418	156	59.575	156	52.479	156	52.011	156	56.301	156	56.090	156	53.090	156	53.245
157	54.349	157	54.805	157	58.718	157	59.265	157	56.300	157	57.051	157	58.643	157	58.648
158	60.131	158	57.922	158	60.277	158	57.697	158	57.581	158	55.809	158	57.686	158	57.429
159	64.492	159	64.070	159	56.259	159	55.331	159	62.213	159	58.550	159	53.378	159	52.600
161	38.231	161	39.654	161	41.990	161	40.558	161	44.658	161	45.449	161	46.136	161	46.089
162	61.885	162	61.696	162	63.739	162	65.831	162	61.288	162	59.840	162	55.905	162	55.642
163	46.781	163	42.439	163	45.740	163	42.155	163	44.596	163	43.141	163	42.152	163	41.575
164	57.446	164	55.375	164	54.397	164	52.773	164	55.034	164	53.518	164	57.151	164	56.651
166	53.494	166	54.661	166	51.913	166	52.203	166	44.161	166	44.744	166	50.253	166	50.049
167	57.697	167	58.752	167	61.669	167	62.555	167	55.208	167	54.415	167	56.905	167	57.408
168	40.908	168	40.383	168	40.879	168	39.449	168	38.668	168	40.048	168	44.193	168	44.400
169	45.799	169	45.693	169	56.048	169	54.407	169	46.034	169	40.417	169	50.584	169	50.532
170	39.274	170	39.509	170	39.278	170	39.308	170	39.393	170	37.605	170	39.716	170	40.258
171	38.071	171	39.019	171	44.228	171	44.654	171	51.322	171	45.697	171	48.289	171	48.107
173	42.136	173	39.589	173	41.720	173	40.395	173	41.786	173	41.691	173	40.019	173	39.837
174	45.653	174	43.824	174	48.042	174	41.874	174	45.556	174	44.496	174	44.629	174	44.498
175	49.474	175	48.326	175	52.118	175	51.967	175	52.458	175	50.753	175	49.254	175	49.292
177	55.226	177	55.195	177	53.628	177	51.360	177	53.865	177	51.891	177	56.468	177	56.455
178	48.905	178	49.553	178	50.515	178	51.981	178	52.829	178	54.568	178	52.133	178	52.144
180	46.372	180	45.642	180	43.241	180	42.828	180	42.879	180	43.662	180	44.650	180	44.610
181	43.922	181	43.564	181	46.299	181	44.957	181	48.200	181	46.643	181	43.714	181	43.685
182	51.055	182	50.686	182	53.159	182	52.137	182	53.043	182	54.495	182	49.796	182	50.399
183	56.579	183	56.414	183	58.112	183	58.193	183	51.413	183	48.446	183	52.414	183	52.446
184	59.600	184	56.306	184	58.217	184	56.314	184	60.037	184	60.601	184	58.911	184	58.634
185	42.171	185	42.114	185	42.508	185	42.842	185	43.484	185	43.230	185	40.237	185	40.349
186	53.365	186	55.433	186	50.542	186	52.980	186	52.870	186	55.072	186	54.948	186	54.934
187	42.202	187	43.810	187	42.169	187	45.342	187	43.619	187	43.702	187	47.508	187	47.925
188	42.667	188	43.781	188	39.653	188	41.497	188	41.244	188	46.987	188	49.380	188	49.425
189	39.973	189	33.608	189	39.325	189	33.940	189	40.522	189	35.121	189	33.198	189	33.403
190	42.161	190	42.410	190	41.353	190	41.216	190	43.991	190	46.130	190	46.079	190	46.033
192	68.416	192	66.479	192	66.348	192	63.383	192	65.906	192	65.986	192	67.625	192	67.500
193	47.551	193	51.797	193	53.896	193	53.763	193	53.146	193	59.503	193	54.469	193	55.039
194	56.476	194	58.074	194	52.886	194	54.089	194	52.320	194	53.181	194	55.856	194	55.929
195	40.354	195	41.349	195	34.659	195	36.979	195	33.752	195	39.023	195	44.045	195	43.986
197	41.729	197	39.625	197	41.369	197	38.199	197	41.517	197	43.141	197	40.547	197	41.071
198	51.898	198	50.815	198	52.900	198	53.157	198	56.145	198	50.794	198	45.129	198	45.002
199	50.120	199	51.075	199	50.185	199	50.185	199	50.142	199	49.199	199	49.240	199	49.285
200	67.063	200	64.329	200	68.033	200	67.250	200	67.473	200	69.383	200	65.408	200	65.804
201	51.247	201	51.486	201	48.895	201	50.806	201	51.588	201	53.502	201	52.421	201	52.572
202	61.747	202	61.559	202	60.494	202	59.997	202	59.944	202	62.172	202	61.220	202	61.704

TABLE 9
COMPARISON OF READING MODELS
(ARRANGED BY ID NUMBER)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
203	62.960	203	65.274	203	61.987	203	65.609	203	51.022	203	50.641	203	55.300	203	55.943
204	54.594	204	48.774	204	61.352	204	54.599	204	59.138	204	46.034	204	50.753	204	50.869
205	77.631	205	75.513	205	74.577	205	74.105	205	74.652	205	74.046	205	77.064	205	77.067
206	53.558	206	52.085	206	47.672	206	43.826	206	52.427	206	48.782	206	51.302	206	51.310
207	52.899	207	53.175	207	51.644	207	53.142	207	50.695	207	51.491	207	53.829	207	53.847
209	35.832	209	34.199	209	37.316	209	35.744	209	36.502	209	36.467	209	35.437	209	35.632
210	69.017	210	68.319	210	64.264	210	64.951	210	67.185	210	69.014	210	64.042	210	63.926
211	47.616	211	55.772	211	57.638	211	55.996	211	51.057	211	51.322	211	54.089	211	54.002
212	53.400	212	52.403	212	49.834	212	50.991	212	49.815	212	51.755	212	45.861	212	45.262
213	32.624	213	31.825	213	35.254	213	33.873	213	35.660	213	34.303	213	30.059	213	29.976
214	52.299	214	49.986	214	54.474	214	52.299	214	52.300	214	55.337	214	57.341	214	57.450
215	29.101	215	33.247	215	26.863	215	31.034	215	25.210	215	27.573	215	28.243	215	28.343
216	50.611	216	49.538	216	61.599	216	53.793	216	56.929	216	53.935	216	53.125	216	53.175
217	45.299	217	44.142	217	49.905	217	49.578	217	47.111	217	46.907	217	42.236	217	42.143
218	53.967	218	55.700	218	54.880	218	55.930	218	60.573	218	56.947	218	55.040	218	55.172
219	53.000	219	51.486	219	56.271	219	55.886	219	52.319	219	49.015	219	53.456	219	53.266
220	40.566	220	40.743	220	38.647	220	39.352	220	41.309	220	38.694	220	36.753	220	36.830
222	69.296	222	73.767	222	68.114	222	73.343	222	69.205	222	75.096	222	78.542	222	78.714
224	61.377	224	57.165	224	51.525	224	54.939	224	54.963	224	53.750	224	53.794	224	53.630
225	48.928	225	45.650	225	57.808	225	51.360	225	54.263	225	47.885	225	46.487	225	46.397
226	54.376	226	56.292	226	54.361	226	54.954	226	56.712	226	57.212	226	59.889	226	59.861
228	49.855	228	52.381	228	48.722	228	50.599	228	47.702	228	46.827	228	52.287	228	52.116
229	44.665	229	43.795	229	46.451	229	46.576	229	44.916	229	47.532	229	47.177	229	47.091
230	48.416	230	50.361	230	42.122	230	37.474	230	57.140	230	52.452	230	55.490	230	55.347
232	43.804	232	44.675	232	42.313	232	41.674	232	44.574	232	42.220	232	45.565	232	45.886
233	58.233	233	56.934	233	59.895	233	59.191	233	53.401	233	54.119	233	54.892	233	54.913
235	48.979	235	48.088	235	47.422	235	47.419	235	46.808	235	45.601	235	45.242	235	45.143
236	56.051	236	56.804	236	57.181	236	57.882	236	56.494	236	57.260	236	61.156	236	61.193
237	58.114	237	57.634	237	57.498	237	59.464	237	60.600	237	63.910	237	59.636	237	59.405
250	44.560	250	43.160	250	43.932	250	41.600	250	45.799	250	45.048	250	44.284	250	44.042
251	19.247	251	29.784	251	18.356	251	32.579	251	18.397	251	31.627	251	29.334	251	28.910
256	59.120	256	60.577	256	57.819	256	60.218	256	57.380	256	61.867	256	64.000	256	63.835
262	56.213	262	55.007	262	53.550	262	55.405	262	52.501	262	55.024	262	55.279	262	55.747
263	52.042	263	50.592	263	55.394	263	54.007	263	55.075	263	54.439	263	56.095	263	56.209
264	52.131	264	53.095	264	55.426	264	55.767	264	55.539	264	56.210	264	50.852	264	50.595
265	37.550	265	42.230	265	32.552	265	37.859	265	35.256	265	42.597	265	45.425	265	45.381
267	47.187	267	46.703	267	47.320	267	47.175	267	43.100	267	43.205	267	46.769	267	46.530
827	60.083	827	59.777	827	59.414	827	59.339	827	59.401	827	59.968	827	55.180	827	55.873
828	54.203	828	63.803	828	43.944	828	62.437	828	54.097	828	60.761	828	52.154	828	53.910

TABLE 9
COMPARISON OF READING MODELS
(ARRANGED BY ID NUMBER)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
101	38.511	101	38.544	101	38.503	101	43.518	101	44.893	101	38.470	101	50.187	101	48.274
104	46.397	104	48.161	104	48.180	104	39.881	104	43.624	104	38.071	104	49.038	104	49.490
105	51.113	105	50.791	105	50.580	105	56.028	105	55.516	105	52.207	105	51.751	105	49.263
106	45.965	106	46.001	106	46.531	106	46.595	106	44.729	106	47.564	106	49.925	106	49.246
108	46.206	108	46.250	108	46.587	108	50.560	108	49.340	108	49.243	108	51.110	108	48.877
109	56.297	109	57.884	109	57.850	109	43.016	109	47.132	109	47.234	109	51.204	109	49.059
110	51.773	110	52.516	110	52.314	110	55.679	110	53.632	110	58.251	110	52.149	110	50.064
112	41.468	112	40.141	112	39.466	112	52.779	112	49.558	112	48.510	112	49.751	112	47.172
113	67.134	113	66.432	113	66.578	113	55.789	113	52.014	113	65.488	113	55.622	113	53.408
114	65.814	114	67.159	114	67.024	114	62.904	114	63.054	114	76.701	114	49.451	114	53.940
115	78.963	115	79.106	115	79.101	115	67.481	115	69.693	115	73.436	115	54.951	115	51.856
116	53.801	116	52.702	116	53.093	116	55.133	116	57.801	116	50.404	116	52.853	116	47.145
117	33.944	117	34.081	117	34.284	117	31.094	117	29.825	117	31.543	117	47.892	117	45.244
118	47.489	118	48.032	118	48.194	118	45.341	118	42.755	118	52.484	118	46.445	118	50.842
119	70.041	119	69.176	119	68.978	119	76.357	119	77.295	119	68.779	119	56.858	119	58.185
120	49.794	120	49.479	120	48.973	120	51.313	120	51.218	120	45.736	120	50.837	120	52.915
121	42.639	121	43.277	121	43.267	121	39.638	121	40.594	121	43.181	121	47.543	121	47.957
124	23.930	124	24.907	124	24.968	124	16.181	124	16.700	124	27.457	124	42.056	124	41.684
125	51.716	125	51.604	125	51.189	125	50.851	125	49.420	125	41.023	125	48.480	125	55.464
126	47.730	126	48.196	126	47.904	126	54.717	126	56.157	126	45.362	126	50.923	126	53.141
127	41.007	127	40.818	127	40.945	127	47.062	127	50.347	127	46.914	127	42.635	127	39.624
128	60.496	128	61.948	128	61.878	128	53.553	128	55.000	128	59.791	128	52.349	128	47.573
129	49.503	129	50.157	129	50.325	129	47.422	129	46.986	129	47.327	129	49.493	129	49.741
130	44.596	130	43.441	130	43.692	130	52.049	130	51.985	130	45.818	130	51.502	130	47.991
131	57.701	131	55.646	131	55.330	131	60.674	131	62.314	131	55.526	131	53.092	131	48.127
132	36.575	132	37.083	132	37.024	132	29.887	132	29.575	132	32.528	132	44.652	132	49.099
133	29.341	133	29.405	133	29.577	133	29.426	133	28.322	133	30.470	133	46.332	133	46.195
136	57.787	136	56.644	136	56.484	136	61.199	136	62.255	136	57.629	136	52.756	136	48.589
137	48.475	137	50.349	137	50.389	137	43.152	137	46.020	137	44.394	137	50.648	137	46.652
139	51.014	139	52.937	139	52.852	139	35.443	139	38.580	139	42.548	139	48.699	139	46.503
140	50.709	140	51.639	140	51.762	140	46.965	140	49.271	140	53.735	140	51.017	140	44.354
142	23.902	142	24.422	142	24.239	142	32.037	142	29.889	142	37.834	142	38.668	142	48.736
144	35.291	144	33.925	144	33.385	144	39.002	144	36.523	144	34.130	144	46.290	144	49.906
145	49.979	145	49.843	145	49.653	145	58.426	145	59.444	145	52.407	145	51.902	145	49.780
147	41.256	147	40.483	147	40.443	147	49.616	147	51.969	147	40.855	147	49.225	147	52.430
148	48.979	148	46.436	148	46.531	148	53.581	148	50.394	148	45.619	148	52.398	148	52.079
149	50.943	149	49.615	149	50.014	149	46.360	149	44.994	149	43.258	149	49.899	149	49.431
150	55.666	150	55.753	150	55.719	150	46.988	150	49.746	150	53.358	150	51.574	150	46.567
152	41.135	152	40.077	152	40.287	152	45.694	152	45.380	152	43.901	152	50.263	152	47.443
153	47.298	153	46.756	153	46.524	153	65.274	153	60.255	153	55.927	153	51.756	153	57.595

TABLE 9
COMPARISON OF READING MODELS
(ARRANGED BY ID NUMBER)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
156	52.773	156	53.714	156	53.801	156	63.207	156	61.083	156	62.824	156	52.017	156	53.760
157	59.219	157	57.756	157	57.694	157	59.861	157	62.417	157	59.064	157	52.380	157	50.877
158	58.099	158	56.473	158	56.979	158	59.653	158	59.092	158	57.521	158	51.641	158	53.188
159	52.269	159	50.991	159	51.571	159	58.102	159	56.012	159	55.004	159	51.134	159	57.681
161	46.312	161	47.319	161	47.317	161	45.892	161	45.137	161	48.002	161	50.284	161	48.493
162	53.255	162	51.675	162	51.897	162	64.333	162	63.975	162	54.076	162	52.538	162	59.894
163	40.632	163	42.116	163	42.184	163	37.881	163	37.916	163	42.394	163	49.801	163	43.529
164	56.304	164	54.840	164	54.898	164	55.052	164	58.298	164	51.166	164	52.642	164	46.836
166	48.135	166	48.189	166	48.711	166	58.403	166	53.501	166	52.864	166	50.856	166	56.439
167	52.595	167	54.391	167	54.424	167	54.357	167	58.397	167	48.399	167	52.770	167	50.987
168	44.475	168	43.192	168	42.928	168	42.333	168	40.956	168	35.988	168	49.527	168	48.673
169	49.922	169	51.918	169	52.024	169	56.692	169	57.197	169	54.199	169	50.902	169	54.160
170	38.745	170	38.223	170	38.093	170	40.699	170	42.966	170	35.477	170	49.939	170	46.422
171	46.447	171	45.744	171	45.533	171	53.723	171	52.400	171	45.578	171	49.475	171	54.291
173	39.561	173	39.015	173	39.664	173	49.017	173	46.105	173	47.421	173	49.478	173	49.108
174	43.731	174	43.206	174	43.685	174	42.746	174	40.957	174	40.857	174	48.413	174	49.375
175	51.142	175	52.181	175	52.109	175	44.957	175	46.702	175	53.675	175	50.308	175	47.477
177	56.397	177	55.268	177	55.344	177	47.324	177	51.118	177	44.472	177	50.767	177	47.178
178	53.283	178	53.792	178	53.546	178	45.049	178	45.283	178	51.643	178	50.092	178	47.728
180	42.993	180	44.176	180	44.485	180	48.901	180	48.056	180	47.810	180	50.814	180	49.782
181	43.603	181	42.001	181	41.901	181	46.757	181	47.918	181	41.339	181	49.768	181	47.956
182	50.106	182	49.444	182	48.619	182	54.288	182	52.694	182	47.963	182	50.179	182	52.300
183	55.021	183	55.575	183	55.167	183	51.699	183	51.813	183	57.679	183	48.039	183	53.588
184	58.212	184	56.622	184	56.647	184	54.833	184	53.677	184	47.682	184	52.251	184	47.209
185	41.518	185	41.852	185	41.689	185	36.860	185	39.444	185	42.824	185	46.624	185	46.644
186	55.517	186	56.295	186	56.236	186	50.329	186	54.089	186	56.368	186	50.574	186	47.051
187	44.709	187	46.172	187	46.106	187	52.917	187	55.326	187	49.545	187	51.027	187	51.695
188	48.901	188	48.688	188	48.095	188	52.403	188	51.056	188	50.138	188	50.645	188	48.511
189	33.384	189	34.680	189	34.943	189	41.326	189	41.190	189	45.921	189	44.319	189	46.342
190	46.574	190	45.644	190	45.816	190	53.952	190	54.942	190	53.819	190	50.978	190	49.503
192	67.141	192	66.624	192	66.692	192	67.105	192	66.256	192	68.263	192	53.525	192	51.582
193	54.865	193	55.061	193	54.381	193	53.108	193	49.452	193	49.661	193	50.245	193	57.551
194	56.191	194	57.514	194	57.510	194	53.745	194	55.267	194	58.627	194	51.931	194	49.288
195	43.546	195	45.238	195	45.172	195	52.903	195	50.632	195	47.663	195	49.203	195	55.104
197	39.880	197	39.613	197	39.629	197	49.472	197	46.478	197	43.697	197	48.832	197	49.286
198	44.064	198	43.506	198	43.381	198	58.780	198	57.384	198	46.164	198	51.682	198	55.058
199	47.277	199	47.769	199	47.755	199	55.547	199	53.160	199	46.238	199	50.792	199	51.431
200	65.162	200	66.667	200	66.939	200	56.846	200	54.617	200	72.140	200	50.372	200	51.769
201	52.950	201	53.650	201	53.489	201	43.650	201	44.260	201	51.891	201	51.618	201	47.354
202	61.602	202	61.114	202	60.512	202	56.063	202	54.138	202	51.617	202	51.806	202	51.315

TABLE 9
COMPARISON OF READING MODELS
(ARRANGED BY ID NUMBER)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
203	54.702	203	54.284	203	53.751	203	64.560	203	61.863	203	57.147	203	53.039	203	56.030
204	50.766	204	49.786	204	49.943	204	50.628	204	52.652	204	48.050	204	51.796	204	48.811
205	78.608	205	77.909	205	77.905	205	63.110	205	62.586	205	69.022	205	54.080	205	50.557
206	49.893	206	50.335	206	50.460	206	44.482	206	45.197	206	39.458	206	49.339	206	50.519
207	53.836	207	53.849	207	54.219	207	60.463	207	56.855	207	65.396	207	52.745	207	49.341
209	34.873	209	34.531	209	34.475	209	42.102	209	42.890	209	35.633	209	47.356	209	48.015
210	64.346	210	63.117	210	62.996	210	62.427	210	64.986	210	62.629	210	53.618	210	50.860
211	54.184	211	53.714	211	54.466	211	57.802	211	57.415	211	58.599	211	49.875	211	53.615
212	44.837	212	43.242	212	43.572	212	45.023	212	41.490	212	38.320	212	47.502	212	54.567
213	31.426	213	31.864	213	31.828	213	32.559	213	30.614	213	30.540	213	45.770	213	47.095
214	56.077	214	58.561	214	58.685	214	42.641	214	42.608	214	58.606	214	50.809	214	47.403
215	30.235	215	31.166	215	30.801	215	32.048	215	31.696	215	34.134	215	43.600	215	49.677
216	54.468	216	57.086	216	57.142	216	54.664	216	55.375	216	62.312	216	52.146	216	47.250
217	41.908	217	38.651	217	38.298	217	44.581	217	42.585	217	39.435	217	50.740	217	45.209
218	55.992	218	54.035	218	53.999	218	56.900	218	59.319	218	52.296	218	51.267	218	52.855
219	57.950	219	58.433	219	58.211	219	45.340	219	47.587	219	49.407	219	48.940	219	49.818
220	38.830	220	39.841	220	39.813	220	34.588	220	36.171	220	36.885	220	44.605	220	50.104
222	78.743	222	78.059	222	77.926	222	71.856	222	72.714	222	71.497	222	57.112	222	52.478
224	53.234	224	53.521	224	54.070	224	52.237	224	52.148	224	51.368	224	49.251	224	58.094
225	48.170	225	49.458	225	49.582	225	32.559	225	35.134	225	36.043	225	47.976	225	47.318
226	59.368	226	59.723	226	59.790	226	59.017	226	59.871	226	59.046	226	51.976	226	49.195
228	51.773	228	52.160	228	52.222	228	54.406	228	54.825	228	52.368	228	53.337	228	50.128
229	47.043	229	45.537	229	46.014	229	51.220	229	50.044	229	48.154	229	50.815	229	48.314
230	54.368	230	55.952	230	55.422	230	54.611	230	55.700	230	52.022	230	50.602	230	57.567
232	46.922	232	47.847	232	48.102	232	49.443	232	47.972	232	54.293	232	50.079	232	51.147
233	54.198	233	53.735	233	54.240	233	65.891	233	64.287	233	62.626	233	51.975	233	59.627
235	47.496	235	47.776	235	47.423	235	42.711	235	42.047	235	46.904	235	48.059	235	49.373
236	61.843	236	60.493	236	60.469	236	57.509	236	56.442	236	59.863	236	53.402	236	49.922
237	59.957	237	62.439	237	62.480	237	62.073	237	64.310	237	69.170	237	53.000	237	49.805
250	43.802	250	44.183	250	44.251	250	43.544	250	41.928	250	46.122	250	51.954	250	42.312
251	30.129	251	29.925	251	29.980	251	24.061	251	24.324	251	31.081	251	40.425	251	47.470
256	64.205	256	65.113	256	65.071	256	56.467	256	57.725	256	62.111	256	53.742	256	47.755
262	55.865	262	55.190	262	54.941	262	44.437	262	47.222	262	51.846	262	51.069	262	45.222
263	56.567	263	57.321	263	57.616	263	51.415	263	51.374	263	60.768	263	49.757	263	50.722
264	51.716	264	53.386	264	53.440	264	45.860	264	49.185	264	47.675	264	51.962	264	47.814
265	45.575	265	43.948	265	44.350	265	43.731	265	41.974	265	47.158	265	49.436	265	46.284
267	47.085	267	47.063	267	46.736	267	37.703	267	37.770	267	46.109	267	45.382	267	48.024
827	55.666	827	52.488	827	50.778	827	57.919	827	58.683	827	59.575	827	49.602	827	56.973
828	54.453	828	54.555	828	56.349	828	47.985	828	46.871	828	53.546	828	46.861	828	64.091

TABLE 10
COMPARISON OF MATH MODELS
(ARRANGED BY ID NUMBER)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
101	44.961	101	46.082	101	45.718	101	45.825	101	43.661	101	43.967	101	43.950	101	43.602
104	65.337	104	63.438	104	66.883	104	67.342	104	63.135	104	64.654	104	64.246	104	64.277
105	43.840	105	42.810	105	44.537	105	42.153	105	42.878	105	40.090	105	41.864	105	42.025
106	48.592	106	48.011	106	51.076	106	49.630	106	47.406	106	45.153	106	44.297	106	44.929
108	58.117	108	57.306	108	60.168	108	60.845	108	64.120	108	63.711	108	59.538	108	59.529
109	53.634	109	53.351	109	53.609	109	53.328	109	56.444	109	56.078	109	57.461	109	57.653
110	57.200	110	55.993	110	58.324	110	56.837	110	57.736	110	57.044	110	56.826	110	55.946
112	34.791	112	36.435	112	38.197	112	37.961	112	35.496	112	36.658	112	38.898	112	38.636
113	69.875	113	68.673	113	70.235	113	70.605	113	69.828	113	69.640	113	74.051	113	72.716
114	49.928	114	49.122	114	49.144	114	48.647	114	49.641	114	48.509	114	47.482	114	47.447
115	64.779	115	65.367	115	66.520	115	68.092	115	65.659	115	68.499	115	69.771	115	69.997
116	43.047	116	42.964	116	44.839	116	44.415	116	45.446	116	44.996	116	43.158	116	43.417
117	36.836	117	39.733	117	35.472	117	37.524	117	35.914	117	37.161	117	39.803	117	40.318
118	56.756	118	55.783	118	60.853	118	59.562	118	58.087	118	58.221	118	56.119	118	56.612
119	57.556	119	55.430	119	59.611	119	58.812	119	59.609	119	56.658	119	58.451	119	58.557
120	42.050	120	40.150	120	41.148	120	36.775	120	43.103	120	39.282	120	39.270	120	39.080
121	42.269	121	42.724	121	43.248	121	43.383	121	41.481	121	41.671	121	40.482	121	40.117
124	28.288	124	27.845	124	23.287	124	19.635	124	27.586	124	24.727	124	26.778	124	26.429
125	53.001	125	53.565	125	53.086	125	54.801	125	49.928	125	52.314	125	53.217	125	53.260
126	50.792	126	50.657	126	52.828	126	51.397	126	49.565	126	48.221	126	48.763	126	47.447
127	39.602	127	37.621	127	41.901	127	39.230	127	42.959	127	40.194	127	38.498	127	38.467
128	72.642	128	73.045	128	72.583	128	73.179	128	72.020	128	74.065	128	73.659	128	73.749
129	49.132	129	48.702	129	49.641	129	43.313	129	46.443	129	47.687	129	45.065	129	45.171
130	42.790	130	44.563	130	46.327	130	47.624	130	46.159	130	48.594	130	46.981	130	47.346
131	49.798	131	49.546	131	53.653	131	52.535	131	50.702	131	49.816	131	53.597	131	53.683
132	52.385	132	51.700	132	56.893	132	56.502	132	63.791	132	67.430	132	54.413	132	54.426
133	31.945	133	33.920	133	29.613	133	29.343	133	33.971	133	33.496	133	33.111	133	32.972
136	50.069	136	50.045	136	46.192	136	48.655	136	46.886	136	50.099	136	50.344	136	50.137
137	52.337	137	53.021	137	52.980	137	54.633	137	49.959	137	53.226	137	54.959	137	54.914
139	54.778	139	55.306	139	56.061	139	55.991	139	55.576	139	56.420	139	55.654	139	55.761
140	57.694	140	58.774	140	56.091	140	57.618	140	56.789	140	56.370	140	62.092	140	62.082
142	46.422	142	45.538	142	42.391	142	40.945	142	43.376	142	40.117	142	41.945	142	41.775
144	32.737	144	32.453	144	34.104	144	33.376	144	34.778	144	34.592	144	30.661	144	31.052
145	45.485	145	47.621	145	45.505	145	48.135	145	44.970	145	47.853	145	46.383	145	46.700
147	51.006	147	51.569	147	53.259	147	55.374	147	51.160	147	53.262	147	52.934	147	52.860
148	66.581	148	65.213	148	65.826	148	67.739	148	64.106	148	63.437	148	64.263	148	63.861
149	50.333	149	49.565	149	52.289	149	51.988	149	50.482	149	50.440	149	50.901	149	51.146
150	46.021	150	47.478	150	45.958	150	45.526	150	44.941	150	45.229	150	47.106	150	46.789
152	54.885	152	52.511	152	52.309	152	51.675	152	48.374	152	54.317	152	54.692	152	54.672
153	49.601	153	50.334	153	46.128	153	48.700	153	49.679	153	49.142	153	49.022	153	48.834

TABLE 10
COMPARISON OF MATH MODELS
(ARRANGED BY ID NUMBER)

DALLAS		HLM		DALLAS		HLM		DALLAS		HLM		HLM		HLM	
ID	FULL	ID	FULL	ID	MC	ID	MC	ID	MCL	ID	MCL	ID	MCC01	ID	MCC02
156	51.379	156	49.437	156	49.981	156	46.817	156	50.977	156	48.778	156	46.694	156	46.837
157	42.062	157	42.867	157	39.984	157	41.188	157	36.047	157	37.453	157	42.968	157	42.864
158	52.766	158	52.045	158	50.688	158	51.605	158	50.304	158	50.121	158	52.558	158	52.211
159	50.455	159	50.556	159	43.053	159	42.775	159	42.065	159	40.607	159	42.030	159	41.109
161	35.062	161	35.238	161	33.829	161	32.935	161	34.641	161	35.665	161	38.239	161	38.507
162	53.007	162	51.220	162	54.854	162	56.665	162	54.445	162	53.140	162	49.341	162	49.097
163	41.605	163	43.272	163	42.939	163	41.756	163	43.982	163	44.057	163	39.795	163	40.254
164	59.828	164	55.667	164	64.484	164	63.190	164	63.460	164	61.896	164	62.383	164	62.687
166	50.386	166	49.625	166	54.708	166	55.418	166	47.649	166	44.807	166	48.986	166	48.685
167	59.618	167	57.547	167	61.625	167	59.870	167	58.290	167	56.343	167	59.675	167	59.190
168	47.414	168	46.071	168	43.081	168	42.616	168	45.156	168	44.928	168	46.985	168	46.958
169	62.168	169	60.995	169	62.439	169	64.649	169	54.705	169	55.975	169	60.237	169	60.348
170	43.121	170	42.945	170	43.416	170	41.051	170	45.654	170	43.140	170	43.239	170	42.912
171	33.666	171	38.637	171	30.906	171	33.619	171	34.244	171	34.690	171	41.755	171	41.755
173	45.875	173	44.964	173	46.772	173	43.877	173	48.658	173	46.847	173	44.116	173	43.856
174	41.184	174	40.379	174	36.801	174	34.769	174	42.170	174	40.252	174	39.322	174	39.128
175	43.016	175	44.570	175	46.784	175	46.310	175	46.761	175	46.325	175	45.506	175	45.292
177	48.528	177	49.662	177	50.575	177	52.332	177	49.673	177	53.050	177	52.748	177	52.760
178	60.135	178	58.031	178	58.449	178	58.486	178	58.090	178	56.307	178	61.001	178	60.783
180	57.380	180	55.212	180	57.378	180	56.855	180	55.778	180	55.598	180	55.302	180	55.196
181	45.360	181	44.829	181	44.797	181	43.846	181	48.208	181	46.766	181	44.099	181	44.276
182	53.262	182	53.483	182	54.518	182	56.357	182	53.303	182	54.416	182	54.757	182	55.644
183	55.376	183	55.745	183	57.425	183	57.256	183	53.423	183	54.919	183	54.159	183	54.103
184	54.730	184	54.135	184	52.200	184	52.658	184	50.014	184	52.660	184	50.497	184	51.001
185	47.317	185	47.313	185	46.328	185	44.657	185	46.396	185	45.333	185	42.463	185	42.291
186	48.971	186	51.929	186	44.437	186	45.662	186	44.252	186	46.950	186	46.904	186	46.918
187	42.690	187	42.424	187	46.145	187	45.495	187	42.647	187	39.911	187	45.785	187	45.276
188	36.130	188	38.998	188	34.962	188	37.185	188	31.472	188	34.776	188	36.388	188	36.938
189	46.091	189	44.454	189	48.594	189	43.401	189	50.071	189	47.893	189	41.408	189	42.404
190	40.889	190	41.215	190	38.391	190	40.571	190	38.122	190	39.928	190	40.959	190	40.819
192	73.507	192	74.486	192	65.718	192	69.335	192	68.980	192	71.819	192	73.259	192	73.499
193	42.205	193	54.068	193	47.795	193	48.453	193	53.961	193	52.035	193	53.278	193	53.966
194	57.385	194	57.479	194	54.711	194	55.885	194	53.692	194	55.669	194	55.690	194	55.479
195	33.346	195	36.694	195	32.787	195	37.952	195	26.436	195	29.376	195	38.797	195	38.923
197	41.019	197	42.266	197	37.037	197	40.306	197	41.242	197	43.491	197	41.315	197	42.235
198	44.790	198	44.889	198	47.453	198	45.993	198	48.968	198	48.154	198	38.821	198	38.083
199	54.976	199	53.922	199	55.714	199	54.699	199	53.704	199	52.354	199	51.746	199	51.844
200	61.419	200	58.942	200	61.524	200	59.544	200	61.587	200	60.193	200	57.024	200	57.443
201	53.973	201	51.970	201	53.384	201	51.697	201	56.637	201	54.879	201	51.839	201	51.400
202	57.739	202	58.173	202	58.084	202	58.495	202	57.091	202	58.019	202	58.798	202	59.609

TABLE 10
COMPARISON OF MATH MODELS
(ARRANGED BY ID NUMBER)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
203	59.197	203	58.856	203	57.779	203	57.935	203	59.943	203	60.984	203	54.147	203	54.829
204	42.849	204	43.733	204	46.372	204	46.566	204	45.804	204	39.138	204	48.290	204	47.935
205	69.373	205	65.288	205	71.323	205	68.215	205	71.348	205	67.888	205	69.480	205	69.445
206	52.830	206	52.488	206	45.911	206	49.013	206	55.416	206	48.369	206	48.626	206	49.008
207	66.065	207	65.311	207	63.355	207	62.189	207	64.140	207	63.509	207	64.364	207	64.297
209	45.128	209	45.606	209	46.288	209	45.958	209	45.232	209	45.881	209	46.516	209	46.922
210	59.146	210	57.077	210	58.119	210	56.648	210	56.023	210	55.023	210	55.117	210	55.107
211	46.762	211	48.015	211	46.067	211	48.184	211	46.865	211	48.127	211	48.416	211	48.346
212	39.402	212	39.752	212	39.308	212	38.406	212	39.120	212	38.635	212	37.366	212	37.043
213	52.411	213	51.929	213	53.472	213	53.011	213	50.001	213	50.306	213	51.402	213	51.388
214	61.199	214	57.426	214	58.921	214	56.366	214	64.120	214	61.891	214	60.399	214	60.707
215	27.678	215	34.086	215	25.742	215	29.422	215	28.161	215	30.692	215	27.024	215	27.288
216	56.507	216	56.417	216	56.966	216	52.764	216	49.622	216	53.742	216	54.583	216	54.046
217	41.378	217	41.163	217	46.033	217	44.697	217	40.521	217	38.954	217	38.167	217	38.293
218	62.887	218	61.273	218	61.779	218	60.796	218	63.340	218	61.438	218	60.459	218	59.916
219	49.542	219	48.694	219	49.480	219	49.255	219	48.455	219	46.986	219	48.379	219	48.023
220	37.950	220	40.082	220	36.256	220	37.837	220	38.337	220	38.217	220	35.855	220	35.752
222	70.316	222	68.444	222	68.180	222	71.310	222	69.464	222	71.756	222	71.764	222	71.470
224	59.195	224	53.820	224	50.697	224	52.367	224	59.098	224	58.378	224	55.593	224	55.362
225	49.912	225	48.829	225	48.829	225	49.608	225	51.985	225	51.087	225	47.256	225	47.148
226	51.620	226	52.537	226	53.549	226	54.298	226	54.554	226	55.705	226	57.582	226	57.669
228	57.357	228	58.350	228	60.169	228	61.404	228	54.908	228	54.497	228	61.745	228	61.893
229	46.741	229	47.715	229	46.685	229	47.329	229	48.574	229	50.355	229	49.163	229	49.423
230	52.602	230	52.165	230	48.900	230	47.756	230	59.998	230	56.024	230	57.505	230	57.391
232	31.950	232	32.247	232	37.999	232	35.038	232	35.952	232	37.458	232	33.862	232	34.271
233	60.895	233	60.282	233	60.549	233	61.863	233	62.976	233	64.425	233	65.895	233	66.153
235	47.533	235	46.634	235	47.479	235	45.451	235	47.345	235	45.818	235	44.924	235	44.687
236	52.818	236	51.951	236	56.229	236	55.568	236	56.532	236	56.707	236	56.988	236	56.745
237	60.485	237	57.850	237	62.193	237	61.845	237	65.050	237	65.836	237	63.539	237	63.595
250	36.418	250	34.911	250	40.336	250	35.439	250	39.080	250	35.018	250	35.337	250	35.381
251	20.998	251	33.091	251	22.241	251	32.093	251	22.158	251	29.592	251	30.237	251	29.588
256	54.660	256	55.205	256	53.666	256	51.525	256	55.025	256	53.289	256	52.954	256	53.131
262	68.430	262	64.973	262	64.194	262	60.668	262	62.057	262	59.403	262	63.959	262	63.466
263	48.850	263	48.405	263	52.054	263	51.781	263	49.864	263	49.299	263	53.617	263	53.954
264	43.555	264	44.713	264	47.620	264	49.193	264	48.500	264	51.096	264	40.446	264	40.480
265	47.596	265	47.066	265	48.930	265	47.426	265	45.801	265	46.748	265	52.534	265	52.562
267	41.439	267	43.625	267	43.714	267	42.978	267	39.856	267	39.601	267	40.405	267	39.548
827	49.186	827	50.938	827	47.042	827	49.599	827	49.379	827	51.312	827	49.463	827	50.311
828	57.424	828	58.732	828	52.337	828	62.317	828	58.601	828	64.254	828	55.064	828	56.459

TABLE 10
COMPARISON OF MATH MODELS
(ARRANGED BY ID NUMBER)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
101	43.653	101	44.640	101	45.026	101	48.275	101	48.003	101	47.313	101	49.373	101	48.706
104	63.213	104	62.917	104	62.829	104	63.721	104	62.764	104	63.445	104	55.754	104	52.676
105	41.121	105	41.149	105	41.605	105	42.318	105	42.180	105	43.341	105	48.174	105	47.733
106	44.992	106	44.693	106	43.815	106	45.785	106	45.925	106	42.124	106	47.113	106	51.151
108	60.032	108	59.923	108	58.485	108	68.973	108	69.318	108	62.076	108	57.961	108	54.449
109	57.597	109	57.237	109	56.185	109	51.969	109	50.805	109	51.743	109	53.393	109	48.451
110	56.071	110	55.979	110	56.726	110	49.586	110	50.783	110	51.099	110	51.258	110	51.524
112	38.918	112	39.956	112	42.291	112	40.560	112	40.903	112	42.947	112	47.224	112	45.926
113	74.616	113	74.871	113	74.683	113	68.766	113	67.618	113	67.371	113	58.215	113	59.413
114	48.101	114	47.456	114	47.773	114	52.937	114	53.046	114	53.216	114	48.143	114	51.146
115	70.668	115	70.558	115	71.420	115	70.668	115	70.530	115	73.202	115	59.420	115	52.820
116	43.532	116	44.235	116	45.315	116	44.849	116	44.500	116	42.863	116	52.912	116	43.324
117	39.774	117	39.430	117	38.459	117	34.089	117	34.756	117	33.602	117	48.191	117	45.249
118	56.980	118	56.335	118	56.071	118	57.873	118	58.614	118	55.104	118	49.373	118	55.230
119	57.820	119	58.730	119	59.619	119	64.006	119	63.473	119	62.129	119	53.449	119	56.231
120	39.612	120	40.744	120	41.905	120	40.425	120	40.074	120	39.973	120	45.614	120	50.507
121	41.843	121	41.444	121	41.475	121	42.639	121	42.897	121	42.321	121	47.675	121	47.605
124	25.875	124	25.307	124	24.785	124	25.330	124	25.974	124	26.526	124	41.827	124	41.551
125	51.583	125	51.003	125	52.016	125	51.129	125	50.544	125	48.809	125	46.866	125	54.337
126	44.798	126	43.730	126	45.254	126	47.987	126	47.307	126	46.323	126	49.918	126	51.031
127	38.686	127	38.649	127	39.780	127	45.211	127	44.829	127	45.881	127	55.274	127	40.124
128	73.638	128	73.406	128	73.204	128	71.080	128	72.398	128	68.689	128	61.615	128	53.490
129	45.301	129	44.895	129	44.413	129	45.924	129	45.618	129	41.086	129	49.430	129	48.808
130	47.464	130	48.378	130	47.046	130	51.615	130	51.691	130	52.177	130	50.928	130	48.077
131	53.502	131	54.001	131	56.860	131	53.484	131	54.172	131	55.165	131	52.937	131	48.472
132	55.507	132	54.927	132	55.055	132	54.317	132	53.478	132	54.926	132	50.096	132	54.553
133	33.833	133	33.523	133	33.091	133	34.297	133	34.113	133	34.544	133	44.639	133	46.166
136	50.268	136	50.809	136	52.073	136	52.003	136	52.442	136	56.290	136	51.745	136	47.280
137	54.849	137	54.203	137	55.080	137	48.738	137	47.670	137	50.728	137	53.168	137	46.930
139	55.799	139	55.421	139	54.856	139	55.373	139	54.268	139	52.680	139	54.167	139	47.969
140	62.134	140	61.926	140	62.817	140	61.976	140	62.864	140	64.420	140	57.427	140	47.851
142	42.416	142	42.104	142	42.369	142	48.810	142	48.871	142	48.967	142	43.507	142	52.319
144	31.183	144	30.858	144	31.315	144	31.262	144	30.895	144	29.968	144	38.767	144	47.508
145	46.595	145	47.176	145	48.765	145	48.701	145	48.679	145	49.664	145	50.315	145	47.650
147	52.906	147	51.505	147	51.536	147	58.106	147	56.794	147	55.607	147	53.291	147	52.789
148	64.073	148	63.548	148	62.695	148	67.495	148	67.328	148	65.496	148	55.039	148	56.335
149	51.676	149	51.760	149	50.342	149	47.095	149	46.974	149	47.340	149	49.398	149	50.060
150	47.188	150	47.237	150	48.159	150	46.093	150	45.525	150	47.100	150	51.481	150	44.334
152	55.186	152	55.154	152	53.865	152	53.082	152	53.287	152	55.860	152	51.757	152	49.286
153	46.997	153	47.302	153	47.802	153	50.896	153	51.155	153	48.149	153	47.671	153	56.707

TABLE 10
COMPARISON OF MATH MODELS
(ARRANGED BY ID NUMBER)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
156	46.271	156	47.112	156	47.021	156	50.776	156	51.075	156	49.529	156	47.981	156	52.608
157	43.146	157	43.653	157	44.474	157	42.537	157	42.143	157	45.154	157	48.363	157	45.848
158	52.654	158	53.378	158	51.613	158	54.868	158	54.407	158	56.440	158	50.200	158	52.412
159	40.760	159	41.582	159	39.934	159	43.920	159	43.831	159	40.577	159	46.236	159	54.386
161	38.670	161	38.192	161	38.252	161	36.288	161	35.912	161	38.430	161	46.379	161	46.328
162	47.379	162	48.301	162	47.326	162	53.265	162	52.641	162	47.456	162	50.867	162	57.212
163	39.555	163	39.446	163	38.788	163	41.206	163	41.571	163	38.688	163	50.102	163	42.531
164	62.401	164	62.897	164	62.557	164	61.556	164	62.086	164	63.180	164	56.558	164	48.489
166	47.115	166	47.148	166	46.058	166	47.502	166	47.707	166	45.207	166	47.401	166	56.432
167	55.925	167	55.024	167	55.734	167	60.116	167	59.142	167	56.838	167	55.803	167	50.404
168	47.135	168	48.176	168	48.651	168	47.873	168	48.363	168	50.711	168	49.975	168	51.302
169	59.979	169	60.457	169	60.834	169	61.538	169	61.185	169	60.875	169	52.075	169	55.081
170	40.853	170	39.341	170	39.349	170	40.909	170	41.171	170	37.345	170	49.092	170	46.117
171	40.484	171	39.337	171	39.658	171	35.768	171	35.208	171	39.160	171	45.524	171	51.182
173	43.734	173	45.995	173	44.226	173	47.447	173	47.253	173	46.345	173	48.057	173	49.989
174	38.512	174	39.502	174	38.146	174	35.577	174	35.547	174	35.366	174	45.918	174	48.250
175	46.802	175	46.129	175	46.388	175	45.677	175	45.627	175	47.552	175	49.469	175	46.572
177	52.646	177	53.083	177	51.073	177	48.607	177	48.635	177	47.825	177	51.534	177	46.821
178	61.967	178	60.886	178	61.557	178	58.740	178	58.432	178	61.614	178	53.915	178	51.747
180	53.729	180	53.515	180	52.191	180	52.876	180	53.610	180	51.288	180	52.429	180	52.163
181	44.270	181	44.450	181	45.172	181	48.910	181	48.643	181	48.920	181	50.297	181	47.714
182	55.446	182	55.676	182	58.059	182	54.180	182	54.242	182	54.844	182	51.822	182	53.569
183	55.957	183	55.935	183	56.872	183	55.776	183	55.837	183	58.033	183	49.431	183	54.011
184	50.593	184	51.371	184	52.203	184	45.586	184	47.370	184	44.820	184	51.699	184	46.609
185	43.174	185	43.256	185	43.990	185	47.153	185	46.704	185	47.145	185	49.477	185	47.054
186	47.362	186	47.379	186	47.143	186	49.124	186	48.698	186	48.715	186	51.066	186	44.448
187	42.375	187	42.035	187	42.096	187	41.984	187	41.254	187	38.923	187	49.833	187	48.287
188	36.515	188	37.075	188	39.248	188	33.374	188	33.919	188	38.373	188	46.213	188	46.478
189	42.614	189	41.909	189	41.434	189	50.058	189	52.613	189	47.645	189	48.959	189	48.126
190	41.332	190	41.982	190	40.333	190	33.710	190	34.315	190	36.779	190	47.228	190	46.749
192	73.220	192	73.188	192	73.192	192	73.645	192	73.096	192	78.337	192	58.930	192	54.836
193	53.823	193	53.839	193	54.864	193	48.163	193	48.138	193	51.139	193	46.333	193	58.149
194	55.779	194	56.675	194	57.729	194	52.816	194	53.040	194	51.875	194	54.467	194	49.876
195	38.544	195	39.883	195	40.430	195	37.433	195	36.675	195	37.713	195	44.171	195	52.377
197	41.304	197	42.071	197	42.226	197	42.259	197	43.442	197	42.168	197	46.037	197	48.124
198	37.002	198	37.751	198	38.061	198	47.443	198	46.990	198	42.472	198	46.955	198	52.938
199	50.268	199	51.756	199	52.146	199	56.586	199	56.763	199	53.588	199	51.832	199	53.640
200	56.842	200	55.833	200	55.364	200	53.580	200	54.698	200	51.303	200	50.054	200	53.255
201	51.879	201	51.744	201	52.178	201	49.235	201	50.930	201	47.401	201	52.429	201	49.602
202	59.407	202	60.097	202	61.366	202	48.944	202	49.968	202	48.898	202	49.354	202	51.873

TABLE 10
COMPARISON OF MATH MODELS
(ARRANGED BY ID NUMBER)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
203	53.807	203	53.540	203	54.531	203	60.610	203	60.356	203	58.078	203	50.535	203	57.245
204	47.780	204	48.176	204	46.091	204	50.191	204	49.772	204	48.497	204	50.836	204	46.582
205	70.485	205	70.914	205	70.400	205	60.230	205	61.450	205	59.337	205	55.488	205	51.914
206	47.833	206	47.892	206	47.282	206	46.238	206	45.516	206	41.066	206	49.716	206	50.121
207	64.662	207	65.478	207	64.642	207	66.673	207	67.404	207	65.146	207	54.754	207	54.116
209	46.445	209	46.719	209	47.001	209	55.591	209	55.401	209	55.393	209	50.267	209	49.751
210	55.263	210	54.434	210	53.438	210	55.438	210	55.590	210	55.641	210	54.019	210	49.340
211	48.369	211	48.515	211	46.383	211	50.146	211	49.548	211	48.677	211	48.295	211	51.426
212	36.649	212	36.574	212	35.611	212	33.440	212	33.418	212	29.774	212	42.945	212	51.844
213	52.654	213	52.452	213	52.638	213	47.851	213	48.435	213	49.104	213	50.664	213	51.271
214	59.403	214	58.240	214	57.729	214	60.398	214	61.642	214	61.112	214	53.446	214	51.213
215	28.752	215	28.151	215	28.792	215	25.451	215	25.409	215	27.289	215	39.178	215	47.097
216	55.154	216	53.382	216	53.174	216	48.703	216	49.239	216	52.456	216	51.910	216	46.362
217	37.984	217	37.112	217	38.719	217	37.752	217	38.039	217	37.960	217	46.946	217	44.854
218	60.470	218	61.084	218	60.497	218	66.817	218	66.263	218	62.936	218	56.226	218	54.893
219	51.339	219	51.444	219	52.963	219	43.892	219	43.462	219	51.367	219	49.472	219	47.791
220	37.311	220	37.342	220	37.610	220	38.719	220	38.155	220	40.098	220	44.400	220	49.276
222	71.349	222	71.598	222	72.432	222	71.311	222	71.268	222	73.209	222	59.904	222	54.148
224	55.085	224	54.931	224	53.373	224	47.127	224	46.108	224	51.873	224	47.638	224	57.425
225	48.421	225	48.176	225	47.936	225	43.266	225	42.862	225	43.093	225	48.641	225	47.107
226	57.284	226	57.249	226	56.348	226	63.265	226	63.020	226	61.488	226	54.761	226	49.508
228	61.675	228	62.569	228	61.907	228	64.333	228	64.025	228	63.244	228	56.006	228	52.717
229	49.343	229	49.867	229	47.212	229	45.178	229	46.410	229	44.660	229	50.620	229	48.504
230	56.639	230	56.740	230	58.485	230	48.677	230	47.034	230	57.175	230	48.644	230	56.368
232	35.302	232	35.303	232	34.822	232	40.514	232	39.950	232	39.843	232	43.462	232	48.890
233	65.534	233	65.389	233	64.418	233	66.649	233	66.085	233	67.152	233	51.218	233	60.615
235	46.750	235	46.509	235	47.371	235	42.180	235	41.829	235	44.751	235	46.905	235	49.297
236	57.629	236	56.986	236	56.705	236	52.197	236	52.635	236	53.571	236	53.029	236	50.845
237	64.041	237	63.289	237	63.077	237	62.200	237	62.509	237	64.171	237	54.887	237	50.214
250	35.821	250	35.194	250	34.810	250	42.090	250	43.731	250	41.651	250	48.277	250	41.934
251	30.509	251	30.558	251	30.295	251	34.254	251	34.895	251	33.794	251	40.606	251	47.957
256	53.510	256	53.155	256	52.926	256	52.894	256	53.181	256	52.743	256	52.717	256	47.226
262	63.720	262	64.405	262	65.938	262	63.817	262	64.269	262	66.629	262	55.089	262	48.749
263	54.107	263	53.916	263	52.796	263	59.300	263	59.523	263	57.067	263	52.094	263	51.770
264	41.563	264	41.218	264	40.133	264	42.739	264	42.384	264	39.265	264	49.714	264	45.014
265	53.060	265	53.050	265	50.671	265	43.340	265	43.720	265	50.039	265	48.366	265	47.656
267	39.916	267	40.053	267	41.040	267	45.575	267	45.016	267	46.784	267	47.145	267	48.358
827	50.166	827	46.800	827	50.045	827	48.757	827	48.153	827	52.703	827	47.340	827	54.456
828	56.793	828	57.419	828	54.962	828	47.748	828	46.344	828	52.227	828	46.290	828	63.285

TABLE 11
COMPARISON OF READING MODELS
(ARRANGED BY DALLAS FULL)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
205	77.631	205	75.513	205	74.577	205	74.105	205	74.652	205	74.046	205	77.064	205	77.067
115	73.640	115	72.778	115	73.743	115	75.029	115	76.032	115	77.444	115	78.042	115	77.866
119	71.729	119	74.416	119	69.128	119	71.502	119	66.418	119	66.226	119	70.694	119	70.640
222	69.296	222	73.767	222	68.114	222	73.343	222	69.205	222	75.096	222	78.542	222	78.714
210	69.017	210	68.319	210	64.264	210	64.951	210	67.185	210	69.014	210	64.042	210	63.926
192	68.416	192	66.479	192	66.348	192	63.383	192	65.906	192	65.986	192	67.625	192	67.500
200	67.063	200	64.329	200	68.033	200	67.250	200	67.473	200	69.383	200	65.408	200	65.804
114	66.574	114	64.329	114	63.521	114	63.819	114	64.352	114	63.414	114	64.739	114	64.669
159	64.492	159	64.070	159	56.259	159	55.331	159	62.213	159	58.550	159	53.378	159	52.600
113	63.447	113	62.569	113	63.736	113	64.145	113	67.887	113	64.904	113	66.027	113	64.795
203	62.960	203	65.274	203	61.987	203	65.609	203	51.022	203	50.641	203	55.300	203	55.943
162	61.885	162	61.696	162	63.739	162	65.831	162	61.288	162	59.840	162	55.905	162	55.642
202	61.747	202	61.559	202	60.494	202	59.997	202	59.944	202	62.172	202	61.220	202	61.704
224	61.377	224	57.165	224	51.525	224	54.939	224	54.963	224	53.750	224	53.794	224	53.630
158	60.131	158	57.922	158	60.277	158	57.697	158	57.581	158	55.809	158	57.686	158	57.429
827	60.083	827	59.777	827	59.414	827	59.339	827	59.401	827	59.968	827	55.180	827	55.873
184	59.600	184	56.306	184	58.217	184	56.314	184	60.037	184	60.601	184	58.911	184	58.634
156	59.418	156	59.575	156	52.479	156	52.011	156	56.301	156	56.090	156	53.090	156	53.245
125	59.401	125	60.289	125	57.974	125	56.359	125	57.488	125	56.515	125	54.188	125	53.932
256	59.120	256	60.577	256	57.819	256	60.218	256	57.380	256	61.867	256	64.000	256	63.835
233	58.233	233	56.934	233	59.895	233	59.191	233	53.401	233	54.119	233	54.892	233	54.913
116	58.188	116	53.456	116	57.998	116	52.906	116	56.242	116	53.390	116	54.160	116	53.469
237	58.114	237	57.634	237	57.498	237	59.464	237	60.600	237	63.910	237	59.636	237	59.405
167	57.697	167	58.752	167	61.669	167	62.555	167	55.208	167	54.415	167	56.905	167	57.408
164	57.446	164	55.375	164	54.397	164	52.773	164	55.034	164	53.518	164	57.151	164	56.651
183	56.579	183	56.414	183	58.112	183	58.193	183	51.413	183	48.446	183	52.414	183	52.446
194	56.476	194	58.074	194	52.886	194	54.089	194	52.320	194	53.181	194	55.856	194	55.929
262	56.213	262	55.007	262	53.550	262	55.405	262	52.501	262	55.024	262	55.279	262	55.747
236	56.051	236	56.804	236	57.181	236	57.882	236	56.494	236	57.260	236	61.156	236	61.193
128	56.010	128	57.994	128	58.829	128	60.921	128	57.844	128	60.329	128	60.952	128	60.751
177	55.226	177	55.195	177	53.628	177	51.360	177	53.865	177	51.891	177	56.468	177	56.455
204	54.594	204	48.774	204	61.352	204	54.599	204	59.138	204	46.034	204	50.753	204	50.869
226	54.376	226	56.292	226	54.361	226	54.954	226	56.712	226	57.212	226	59.889	226	59.861
157	54.349	157	54.805	157	58.718	157	59.265	157	56.300	157	57.051	157	58.643	157	58.648
828	54.203	828	63.803	828	43.944	828	62.437	828	54.097	828	60.761	828	52.154	828	53.910
218	53.967	218	55.700	218	54.880	218	55.930	218	60.573	218	56.947	218	55.040	218	55.172
131	53.776	131	53.997	131	55.053	131	53.519	131	53.902	131	53.686	131	57.686	131	57.723
129	53.604	129	53.730	129	57.397	129	57.475	129	57.298	129	57.204	129	49.324	129	49.292
206	53.558	206	52.085	206	47.672	206	43.826	206	52.427	206	48.782	206	51.302	206	51.310
153	53.524	153	54.185	153	48.131	153	48.824	153	50.074	153	50.337	153	49.958	153	49.691

TABLE 11
COMPARISON OF READING MODELS
(ARRANGED BY DALLAS FULL)

DALLAS		HLM		DALLAS		HLM		DALLAS		HLM		HLM		HLM	
ID	FULL	ID	FULL	ID	MC	ID	MC	ID	MCL	ID	MCL	ID	MCC01	ID	MCC02
166	53.494	166	54.661	166	51.913	166	52.203	166	44.161	166	44.744	166	50.253	166	50.049
136	53.463	136	54.964	136	46.632	136	50.170	136	51.554	136	55.777	136	57.602	136	57.513
212	53.400	212	52.403	212	49.834	212	50.991	212	49.815	212	51.755	212	45.861	212	45.262
186	53.365	186	55.433	186	50.542	186	52.980	186	52.870	186	55.072	186	54.948	186	54.934
150	53.098	150	53.774	150	53.743	150	54.200	150	58.722	150	60.745	150	54.786	150	55.137
219	53.000	219	51.486	219	56.271	219	55.886	219	52.319	219	49.015	219	53.456	219	53.266
207	52.899	207	53.175	207	51.644	207	53.142	207	50.695	207	51.491	207	53.829	207	53.847
148	52.553	148	55.108	148	49.695	148	53.653	148	53.175	148	52.572	148	49.296	148	49.327
214	52.299	214	49.986	214	54.474	214	52.299	214	52.300	214	55.337	214	57.341	214	57.450
264	52.131	264	53.095	264	55.426	264	55.767	264	55.539	264	56.210	264	50.852	264	50.595
110	52.129	110	51.422	110	52.925	110	51.153	110	54.840	110	54.728	110	51.907	110	51.668
263	52.042	263	50.592	263	55.394	263	54.007	263	55.075	263	54.439	263	56.095	263	56.209
126	52.024	126	52.035	126	55.040	126	54.695	126	50.715	126	48.406	126	50.746	126	51.408
198	51.898	198	50.815	198	52.900	198	53.157	198	56.145	198	50.794	198	45.129	198	45.002
201	51.247	201	51.486	201	48.895	201	50.806	201	51.588	201	53.502	201	52.421	201	52.572
109	51.198	109	52.121	109	55.898	109	56.203	109	56.483	109	57.917	109	56.454	109	56.286
182	51.055	182	50.686	182	53.159	182	52.137	182	53.043	182	54.495	182	49.796	182	50.399
216	50.611	216	49.538	216	61.599	216	53.793	216	56.929	216	53.935	216	53.125	216	53.175
105	50.236	105	50.080	105	48.414	105	47.782	105	48.666	105	49.976	105	51.858	105	51.990
118	50.148	118	47.684	118	47.138	118	46.606	118	46.438	118	46.699	118	46.438	118	46.965
199	50.120	199	51.075	199	50.185	199	50.185	199	50.142	199	49.199	199	49.240	199	49.285
228	49.855	228	52.381	228	48.722	228	50.599	228	47.702	228	46.827	228	52.287	228	52.116
149	49.687	149	48.882	149	49.611	149	48.972	149	48.592	149	49.560	149	50.338	149	50.189
145	49.502	145	50.339	145	48.526	145	49.845	145	47.435	145	48.518	145	50.176	145	50.147
175	49.474	175	48.326	175	52.118	175	51.967	175	52.458	175	50.753	175	49.254	175	49.292
137	49.275	137	50.613	137	44.000	137	45.667	137	49.175	137	51.755	137	48.817	137	48.689
120	49.242	120	50.570	120	51.570	120	53.623	120	48.703	120	48.574	120	49.078	120	49.089
104	49.009	104	49.380	104	51.560	104	52.558	104	51.359	104	54.672	104	48.106	104	48.093
235	48.979	235	48.088	235	47.422	235	47.419	235	46.808	235	45.601	235	45.242	235	45.143
225	48.928	225	45.650	225	57.808	225	51.360	225	54.263	225	47.885	225	46.487	225	46.397
178	48.905	178	49.553	178	50.515	178	51.981	178	52.829	178	54.568	178	52.133	178	52.144
230	48.416	230	50.361	230	42.122	230	37.474	230	57.140	230	52.452	230	55.490	230	55.347
147	48.346	147	48.507	147	47.099	147	46.133	147	45.489	147	41.491	147	41.546	147	41.386
106	47.619	106	47.764	106	44.173	106	43.58[illegible]	106	43.783	106	45.193	106	45.495	106	45.858
139	47.616	139	48.269	139	46.901	139	46.5[illegible]7	139	50.190	139	50.096	139	50.971	139	50.960
211	47.616	211	55.772	211	57.638	211	55.9[illegible]6	211	51.057	211	51.322	211	54.089	211	54.002
193	47.551	193	51.797	193	53.896	193	53.763	193	53.146	193	59.503	193	54.469	193	55.03[illegible]
140	47.421	140	47.619	140	47.897	140	47.841	140	48.480	140	45.369	140	50.591	140	50.623
108	47.206	108	45.224	108	53.069	108	50.577	108	54.754	108	51.451	108	45.727	108	45.738
267	47.187	267	46.703	267	47.320	26[illegible]	47.175	267	43.100	267	43.205	267	46.769	267	46.530

TABLE 11
COMPARISON OF READING MODELS
(ARRANGED BY DALLAS FULL)

DALLAS ID	DALLAS FULL	HLM ID	HLM FULL	DALLAS ID	DALLAS MC	HLM ID	HLM MC	DALLAS ID	DALLAS MCL	HLM ID	HLM MCL	HLM ID	HLM MCC01	HLM ID	HLM MCC02
163	46.781	163	42.439	163	45.740	163	42.155	163	44.596	163	43.141	163	42.152	163	41.575
180	46.372	180	45.642	180	43.241	180	42.828	180	42.879	180	43.662	180	44.650	180	44.610
169	45.799	169	45.693	169	56.048	169	54.407	169	46.034	169	40.417	169	50.584	169	50.532
174	45.653	174	43.824	174	48.042	174	41.874	174	45.556	174	44.496	174	44.629	174	44.498
217	45.299	217	44.142	217	49.905	217	49.578	217	47.111	217	46.907	217	42.236	217	42.143
229	44.665	229	43.795	229	46.451	229	46.576	229	44.916	229	47.532	229	47.177	229	47.091
250	44.560	250	43.160	250	43.932	250	41.600	250	45.799	250	45.048	250	44.284	250	44.042
130	44.152	130	44.437	130	49.541	130	50.547	130	42.303	130	45.858	130	44.812	130	44.547
181	43.922	181	43.564	181	46.299	181	44.957	181	48.200	181	46.643	181	43.714	181	43.685
232	43.804	232	44.675	232	42.313	232	41.674	232	44.574	232	42.220	232	45.565	232	45.886
121	43.353	121	42.908	121	43.979	121	43.981	121	42.827	121	40.513	121	40.554	121	40.496
188	42.667	188	43.781	188	39.653	188	41.497	188	41.244	188	46.987	188	49.380	188	49.425
187	42.202	187	43.810	187	42.169	187	45.342	187	43.619	187	43.702	187	47.508	187	47.925
185	42.171	185	42.114	185	42.508	185	42.842	185	43.484	185	43.230	185	40.237	185	40.349
190	42.161	190	42.410	190	41.353	190	41.216	190	43.991	190	46.130	190	46.079	190	46.033
173	42.136	173	39.589	173	41.720	173	40.395	173	41.786	173	41.691	173	40.019	173	39.837
197	41.729	197	39.625	197	41.369	197	38.199	197	41.517	197	43.141	197	40.547	197	41.071
168	40.908	168	40.383	168	40.879	168	39.449	168	38.668	168	40.048	168	44.193	168	44.400
220	40.566	220	40.743	220	38.647	220	39.352	220	41.309	220	38.694	220	36.753	220	36.830
112	40.487	112	38.846	112	41.534	112	37.704	112	42.744	112	41.050	112	41.159	112	41.050
195	40.354	195	41.349	195	34.659	195	36.979	195	33.752	195	39.023	195	44.045	195	43.986
189	39.973	189	33.608	189	39.325	189	33.940	189	40.522	189	35.121	189	33.198	189	33.403
127	39.756	127	42.331	127	38.537	127	40.513	127	41.374	127	42.572	127	41.187	127	40.993
170	39.274	170	39.509	170	39.278	170	39.308	170	39.393	170	37.605	170	39.716	170	40.258
152	39.025	152	40.231	152	36.835	152	36.247	152	38.926	152	35.049	152	40.765	152	40.685
161	38.231	161	39.654	161	41.990	161	40.558	161	44.658	161	45.449	161	46.136	161	46.089
171	38.071	171	39.019	171	44.228	171	44.654	171	51.322	171	45.697	171	48.289	171	48.107
265	37.550	265	42.230	265	32.552	265	37.859	265	35.256	265	42.597	265	45.425	265	45.381
132	36.740	132	35.123	132	38.317	132	37.415	132	39.336	132	38.686	132	35.134	132	35.120
144	36.419	144	35.137	144	43.290	144	39.293	144	38.595	144	41.899	144	34.493	144	34.588
209	35.832	209	34.199	209	37.316	209	35.744	209	36.502	209	36.467	209	35.437	209	35.632
101	35.309	101	36.645	101	40.954	101	41.341	101	37.885	101	36.691	101	38.337	101	38.421
117	33.247	117	32.857	117	31.314	117	32.402	117	32.246	117	35.137	117	34.782	117	34.714
213	32.624	213	31.825	213	35.254	213	33.873	213	35.660	213	34.303	213	30.059	213	29.976
133	30.132	133	28.903	133	32.037	133	29.548	133	33.908	133	32.332	133	28.363	133	28.231
124	29.494	124	23.297	124	26.449	124	22.782	124	20.482	124	17.429	124	24.512	124	24.614
215	29.101	215	33.247	215	26.863	215	31.034	215	25.210	215	27.573	215	28.243	215	28.343
142	26.775	142	26.335	142	24.633	142	26.117	142	23.571	142	23.214	142	23.358	142	23.114
251	19.247	251	29.784	251	18.356	251	32.579	251	18.397	251	31.627	251	29.334	251	28.910

TABLE 11
COMPARISON OF READING MODELS
(ARRANGED BY DALLAS FULL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
205	78.608	205	77.909	205	77.905	205	63.110	205	62.586	205	69.022	205	54.080	205	50.557
115	78.963	115	79.106	115	79.101	115	67.481	115	69.693	115	73.436	115	54.951	115	51.856
119	70.041	119	69.176	119	68.978	119	76.357	119	77.295	119	68.779	119	56.858	119	58.185
222	78.743	222	78.059	222	77.926	222	71.856	222	72.714	222	71.497	222	57.112	222	52.478
210	64.346	210	63.117	210	62.996	210	62.427	210	64.986	210	62.629	210	53.618	210	50.860
192	67.141	192	66.624	192	66.692	192	67.105	192	66.256	192	68.263	192	53.525	192	51.582
200	65.162	200	66.667	200	66.939	200	56.846	200	54.617	200	72.140	200	50.372	200	51.769
114	65.814	114	67.159	114	67.024	114	62.904	114	63.054	114	76.701	114	49.451	114	53.940
159	52.269	159	50.991	159	51.571	159	58.102	159	56.012	159	55.004	159	51.134	159	57.681
113	67.134	113	66.432	113	66.578	113	55.789	113	52.014	113	65.488	113	55.622	113	53.408
203	54.702	203	54.284	203	53.751	203	64.560	203	61.863	203	57.147	203	53.039	203	56.030
162	53.255	162	51.675	162	51.897	162	64.333	162	63.975	162	54.076	162	52.538	162	59.894
202	61.602	202	61.114	202	60.512	202	56.063	202	54.138	202	51.617	202	51.806	202	51.315
224	53.234	224	53.521	224	54.070	224	52.237	224	52.148	224	51.368	224	49.251	224	58.094
158	58.099	158	56.473	158	56.979	158	59.653	158	59.092	158	57.521	158	51.641	158	53.188
827	55.666	827	52.488	827	50.778	827	57.919	827	58.683	827	59.575	827	49.602	827	56.973
184	58.212	184	56.622	184	56.647	184	54.833	184	53.677	184	47.682	184	52.251	184	47.209
156	52.773	156	53.714	156	53.801	156	63.207	156	61.083	156	62.824	156	52.017	156	53.760
125	51.716	125	51.604	125	51.189	125	50.851	125	49.420	125	41.023	125	48.480	125	55.464
256	64.205	256	65.113	256	65.071	256	56.467	256	57.725	256	62.111	256	53.742	256	47.755
233	54.198	233	53.735	233	54.240	233	65.891	233	64.287	233	62.626	233	51.975	233	59.627
116	53.801	116	52.702	116	53.093	116	55.133	116	57.801	116	50.404	116	52.853	116	47.145
237	59.957	237	62.439	237	62.480	237	62.073	237	64.310	237	69.170	237	53.000	237	49.805
167	52.595	167	54.391	167	54.424	167	54.357	167	58.397	167	48.399	167	52.770	167	50.987
164	56.304	164	54.840	164	54.898	164	55.052	164	58.298	164	51.166	164	52.642	164	46.836
183	55.021	183	55.575	183	55.167	183	51.699	183	51.813	183	57.679	183	48.039	183	53.588
194	56.191	194	57.514	194	57.510	194	53.745	194	55.267	194	58.627	194	51.931	194	49.288
262	55.865	262	55.190	262	54.941	262	44.437	262	47.222	262	51.846	262	51.069	262	45.222
236	61.843	236	60.493	236	60.469	236	57.509	236	56.442	236	59.863	236	53.402	236	49.922
128	60.496	128	61.948	128	61.878	128	53.553	128	55.000	128	59.791	128	52.349	128	47.573
177	56.397	177	55.268	177	55.344	177	47.324	177	51.118	177	44.472	177	50.767	177	47.178
204	50.766	204	49.786	204	49.943	204	50.628	204	52.652	204	48.050	204	51.796	204	48.811
226	59.368	226	59.723	226	59.790	226	59.017	226	59.871	226	59.046	226	51.976	226	49.195
157	59.219	157	57.756	157	57.694	157	59.861	157	62.417	157	59.064	157	52.380	157	50.877
828	54.453	828	54.555	828	56.349	828	47.985	828	46.871	828	53.546	828	46.861	828	64.091
218	55.992	218	54.035	218	53.999	218	56.900	218	59.319	218	52.296	218	51.267	218	52.855
131	57.701	131	55.646	131	55.330	131	60.674	131	62.314	131	55.526	131	53.092	131	48.127
129	49.503	129	50.157	129	50.325	129	47.422	129	46.986	129	47.327	129	49.493	129	49.741
206	49.893	206	50.335	206	50.460	206	44.482	206	45.197	206	39.458	206	49.339	206	50.519
153	47.298	153	46.756	153	46.524	153	65.274	153	60.255	153	55.927	153	51.756	153	57.595

TABLE 11
COMPARISON OF READING MODELS
(ARRANGED BY DALLAS FULL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
166	48.135	166	48.189	166	48.711	166	58.403	166	53.501	166	52.864	166	50.856	166	56.439
136	57.787	136	56.644	136	56.484	136	61.199	136	62.255	136	57.629	136	52.756	136	48.589
212	44.837	212	43.242	212	43.572	212	45.023	212	41.490	212	38.320	212	47.502	212	54.567
186	55.517	186	56.295	186	56.236	186	50.329	186	54.089	186	56.368	186	50.574	186	47.051
150	55.666	150	55.753	150	55.719	150	46.988	150	49.746	150	53.358	150	51.574	150	46.567
219	57.950	219	58.433	219	58.211	219	45.340	219	47.587	219	49.407	219	48.940	219	49.818
207	53.836	207	53.849	207	54.219	207	60.463	207	56.855	207	65.396	207	52.745	207	49.341
148	48.979	148	46.436	148	46.531	148	53.581	148	50.394	148	45.619	148	52.398	148	52.079
214	56.077	214	58.561	214	58.685	214	42.641	214	42.608	214	58.606	214	50.809	214	47.403
264	51.716	264	53.386	264	53.440	264	45.860	264	49.185	264	47.675	264	51.962	264	47.814
110	51.773	110	52.516	110	52.314	110	55.679	110	53.632	110	58.251	110	52.149	110	50.064
263	56.567	263	57.321	263	57.616	263	51.415	263	51.374	263	60.768	263	49.757	263	50.722
126	47.730	126	48.196	126	47.904	126	54.717	126	56.157	126	45.362	126	50.923	126	53.141
198	44.064	198	43.506	198	43.381	198	58.780	198	57.384	198	46.164	198	51.682	198	55.058
201	52.950	201	53.650	201	53.489	201	43.650	201	44.260	201	51.891	201	51.618	201	47.354
109	56.297	109	57.884	109	57.850	109	43.016	109	47.132	109	47.234	109	51.204	109	49.059
182	50.106	182	49.444	182	48.619	182	54.288	182	52.694	182	47.963	182	50.179	182	52.300
216	54.468	216	57.086	216	57.142	216	54.664	216	55.375	216	62.312	216	52.146	216	47.250
105	51.113	105	50.791	105	50.580	105	56.028	105	55.516	105	52.207	105	51.751	105	49.263
118	47.489	118	48.032	118	48.194	118	45.341	118	42.755	118	52.484	118	46.445	118	50.842
199	47.277	199	47.769	199	47.755	199	55.547	199	53.160	199	46.238	199	50.792	199	51.431
228	51.773	228	52.160	228	52.222	228	54.406	228	54.825	228	52.368	228	53.337	228	50.128
149	50.943	149	49.615	149	50.014	149	46.360	149	44.994	149	43.258	149	49.899	149	49.431
145	49.979	145	49.843	145	49.653	145	58.426	145	59.444	145	52.407	145	51.902	145	49.780
175	51.142	175	52.181	175	52.109	175	44.957	175	46.702	175	53.675	175	50.308	175	47.477
137	48.475	137	50.349	137	50.389	137	43.152	137	46.020	137	44.394	137	50.648	137	46.652
120	49.794	120	49.479	120	48.973	120	51.313	120	51.218	120	45.736	120	50.837	120	52.915
104	46.397	104	48.161	104	48.180	104	39.881	104	43.624	104	38.071	104	49.038	104	49.490
235	47.496	235	47.776	235	47.423	235	42.711	235	42.047	235	46.904	235	48.059	235	49.373
225	48.170	225	49.458	225	49.582	225	32.559	225	35.134	225	36.043	225	47.976	225	47.318
178	53.283	178	53.792	178	53.546	178	45.049	178	45.283	178	51.643	178	50.092	178	47.728
230	54.368	230	55.952	230	55.422	230	54.611	230	55.700	230	52.022	230	50.602	230	57.567
147	41.256	147	40.483	147	40.443	147	49.616	147	51.969	147	40.855	147	49.225	147	52.430
106	45.965	106	46.001	106	46.531	106	46.595	106	44.729	106	47.564	106	49.925	106	49.246
139	51.014	139	52.937	139	52.852	139	35.443	139	38.580	139	42.548	139	48.699	139	46.503
211	54.184	211	53.714	211	54.466	211	57.802	211	57.415	211	58.599	211	49.875	211	53.615
193	54.865	193	55.061	193	54.381	193	53.108	193	49.452	193	49.661	193	50.245	193	57.551
140	50.709	140	51.639	140	51.762	140	46.965	140	49.271	140	53.735	140	51.017	140	44.354
108	46.206	108	46.250	108	46.587	108	50.560	108	49.340	108	49.243	108	51.110	108	48.877
267	47.085	267	47.063	267	46.736	267	37.703	267	37.770	267	46.109	267	45.382	267	48.024

TABLE 11
COMPARISON OF READING MODELS
(ARRANGED BY DALLAS FULL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
163	40.632	163	42.116	163	42.184	163	37.881	163	37.916	163	42.394	163	49.801	163	43.529
180	42.993	180	44.176	180	44.485	180	48.901	180	48.056	180	47.810	180	50.814	180	49.782
169	49.922	169	51.918	169	52.024	169	56.692	169	57.197	169	54.199	169	50.902	169	54.160
174	43.731	174	43.206	174	43.685	174	42.746	174	40.957	174	40.857	174	48.413	174	49.375
217	41.908	217	38.651	217	38.298	217	44.581	217	42.585	217	39.435	217	50.740	217	45.209
229	47.043	229	45.537	229	46.014	229	51.220	229	50.044	229	48.154	229	50.815	229	48.314
250	43.802	250	44.183	250	44.251	250	43.544	250	41.928	250	46.122	250	51.954	250	42.312
130	44.596	130	43.441	130	43.692	130	52.049	130	51.985	130	45.818	130	51.502	130	47.991
181	43.603	181	42.001	181	41.901	181	46.757	181	47.918	181	41.339	181	49.768	181	47.956
232	46.922	232	47.847	232	48.102	232	49.443	232	47.972	232	54.293	232	50.079	232	51.147
121	42.639	121	43.277	121	43.267	121	39.638	121	40.594	121	43.181	121	47.543	121	47.957
188	48.901	188	48.688	188	48.095	188	52.403	188	51.056	188	50.138	188	50.645	188	48.511
187	44.709	187	46.172	187	46.106	187	52.917	187	55.326	187	49.545	187	51.027	187	51.695
185	41.518	185	41.852	185	41.689	185	36.860	185	39.444	185	42.824	185	46.624	185	46.644
190	46.574	190	45.644	190	45.816	190	53.952	190	54.942	190	53.819	190	50.978	190	49.503
173	39.561	173	39.015	173	39.664	173	49.017	173	46.105	173	47.421	173	49.478	173	49.108
197	39.880	197	39.613	197	39.629	197	49.472	197	46.478	197	43.697	197	48.832	197	49.286
168	44.475	168	43.192	168	42.928	168	42.333	168	40.956	168	35.988	168	49.527	168	48.673
220	38.830	220	39.841	220	39.813	220	34.588	220	36.171	220	36.885	220	44.605	220	50.104
112	41.468	112	40.141	112	39.466	112	52.779	112	49.558	112	48.510	112	49.751	112	47.172
195	43.546	195	45.238	195	45.172	195	52.903	195	50.632	195	47.663	195	49.203	195	55.104
189	33.384	189	34.680	189	34.943	189	41.326	189	41.190	189	45.921	189	44.319	189	46.342
127	41.007	127	40.818	127	40.945	127	47.062	127	50.347	127	46.914	127	42.635	127	39.624
170	38.745	170	38.223	170	38.093	170	40.699	170	42.966	170	35.477	170	49.939	170	46.422
152	41.135	152	40.077	152	40.287	152	45.694	152	45.380	152	43.901	152	50.263	152	47.443
161	46.312	161	47.319	161	47.317	161	45.892	161	45.137	161	48.002	161	50.284	161	48.493
171	46.447	171	45.744	171	45.533	171	53.723	171	52.400	171	45.578	171	49.475	171	54.291
265	45.575	265	43.948	265	44.350	265	43.731	265	41.974	265	47.158	265	49.436	265	46.284
132	36.575	132	37.083	132	37.024	132	29.887	132	29.575	132	32.528	132	44.652	132	49.099
144	35.291	144	33.925	144	33.385	144	39.002	144	36.523	144	34.130	144	46.290	144	49.906
209	34.873	209	34.531	209	34.475	209	42.102	209	42.890	209	35.633	209	47.356	209	48.015
101	38.511	101	38.544	101	38.503	101	43.518	101	44.893	101	38.470	101	50.187	101	48.274
117	33.944	117	34.081	117	34.284	117	31.094	117	29.825	117	31.543	117	47.892	117	45.244
213	31.426	213	31.864	213	31.828	213	32.559	213	30.614	213	30.540	213	45.770	213	47.095
133	29.341	133	29.405	133	29.577	133	29.426	133	28.322	133	30.470	133	46.332	133	46.195
124	23.930	124	24.907	124	24.968	124	16.181	124	16.700	124	27.457	124	42.056	124	41.684
215	30.235	215	31.166	215	30.801	215	32.048	215	31.696	215	34.134	215	43.600	215	49.677
142	23.902	142	24.422	142	24.239	142	32.037	142	29.889	142	37.834	142	38.668	142	48.736
251	30.129	251	29.925	251	29.980	251	24.061	251	24.324	251	31.081	251	40.425	251	47.470

TABLE 12
COMPARISON OF MATH MODELS
(ARRANGED BY DALLAS FULL)

DALLAS		HLM		DALLAS		HLM		DALLAS		HLM		HLM		HLM	
ID	FULL	ID	FULL	ID	MC	ID	MC	ID	MCL	ID	MCL	ID	MCC01	ID	MCC02
192	73.507	192	74.486	192	65.718	192	69.335	192	68.980	192	71.819	192	73.259	192	73.499
128	72.642	128	73.045	128	72.583	128	73.179	128	72.020	128	74.065	128	73.659	128	73.749
222	70.316	222	68.444	222	68.180	222	71.310	222	69.464	222	71.756	222	71.764	222	71.470
113	69.875	113	68.673	113	70.235	113	70.605	113	69.828	113	69.640	113	74.051	113	72.716
205	69.373	205	65.288	205	71.323	205	68.215	205	71.348	205	67.888	205	69.480	205	69.445
262	68.430	262	64.973	262	64.194	262	60.668	262	62.057	262	59.403	262	63.959	262	63.466
148	66.581	148	65.213	148	65.826	148	67.739	148	64.106	148	63.437	148	64.263	148	63.861
207	66.065	207	65.311	207	63.355	207	62.189	207	64.140	207	63.509	207	64.364	207	64.297
104	65.337	104	63.438	104	66.883	104	67.342	104	63.135	104	64.654	104	64.246	104	64.277
115	64.779	115	65.367	115	66.520	115	68.092	115	65.659	115	68.499	115	69.771	115	69.997
218	62.887	218	61.273	218	61.779	218	60.796	218	63.340	218	61.438	218	60.459	218	59.916
169	62.168	169	60.995	169	62.439	169	64.649	169	54.705	169	55.975	169	60.237	169	60.348
200	61.419	200	58.942	200	61.524	200	59.544	200	61.587	200	60.193	200	57.024	200	57.443
214	61.199	214	57.426	214	58.921	214	56.366	214	64.120	214	61.891	214	60.399	214	60.707
233	60.895	233	60.282	233	60.549	233	61.863	233	62.976	233	64.425	233	65.895	233	66.153
237	60.485	237	57.850	237	62.193	237	61.845	237	65.050	237	65.836	237	63.539	237	63.595
178	60.135	178	58.031	178	58.449	178	58.486	178	58.090	178	56.307	178	61.001	178	60.783
164	59.828	164	55.667	164	64.484	164	63.190	164	63.460	164	61.896	164	62.383	164	62.687
167	59.618	167	57.547	167	61.625	167	59.870	167	58.290	167	56.343	167	59.675	167	59.190
203	59.197	203	58.856	203	57.779	203	57.935	203	59.943	203	60.984	203	54.147	203	54.829
224	59.195	224	53.820	224	50.697	224	52.367	224	59.098	224	58.378	224	55.593	224	55.362
210	59.146	210	57.077	210	58.119	210	56.648	210	56.023	210	55.023	210	55.117	210	55.107
216	58.507	216	56.417	216	56.966	216	52.764	216	49.622	216	53.742	216	54.583	216	54.046
108	58.117	108	57.306	108	60.168	108	60.845	108	64.120	108	63.711	108	59.538	108	59.529
202	57.739	202	58.173	202	58.084	202	58.495	202	57.091	202	58.019	202	58.798	202	59.609
140	57.694	140	58.774	140	56.091	140	57.618	140	56.789	140	56.370	140	62.092	140	62.082
119	57.556	119	55.430	119	59.611	119	58.812	119	59.609	119	56.658	119	58.451	119	58.557
828	57.424	828	58.732	828	52.337	828	62.317	828	58.601	828	64.254	828	55.064	828	56.459
194	57.385	194	57.479	194	54.711	194	55.885	194	53.692	194	55.669	194	55.690	194	55.479
180	57.380	180	55.212	180	57.378	180	56.855	180	55.778	180	55.598	180	55.302	180	55.196
228	57.357	228	58.350	228	60.169	228	61.404	228	54.908	228	54.497	228	61.745	228	61.893
110	57.200	110	55.993	110	58.324	110	56.837	110	57.736	110	57.044	110	56.826	110	55.946
118	56.756	118	55.783	118	60.853	118	59.562	118	58.087	118	58.221	118	56.119	118	56.612
183	55.376	183	55.745	183	57.425	183	57.256	183	53.423	183	54.919	183	54.159	183	54.103
199	54.976	199	53.922	199	55.714	199	54.699	199	53.704	199	52.354	199	51.746	199	51.844
152	54.885	152	52.511	152	52.309	152	51.675	152	48.374	152	54.317	152	54.692	152	54.672
139	54.778	139	55.306	139	56.061	139	55.991	139	55.576	139	56.420	139	55.654	139	55.761
184	54.730	184	54.135	184	52.200	184	52.658	184	50.014	184	52.660	184	50.497	184	51.001
256	54.660	256	55.205	256	53.666	256	51.525	256	55.025	256	53.289	256	52.954	256	53.131
201	53.973	201	51.970	201	53.384	201	51.697	201	56.637	201	54.879	201	51.839	201	51.400

TABLE 12
COMPARISON OF MATH MODELS
(ARRANGED BY DALLAS FULL)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
109	53.634	109	53.351	109	53.609	109	53.328	109	56.444	109	56.078	109	57.461	109	57.653
182	53.262	182	53.483	182	54.518	182	56.357	182	53.303	182	54.416	182	54.757	182	55.644
162	53.007	162	51.220	162	54.854	162	56.665	162	54.445	162	53.140	162	49.341	162	49.097
125	53.001	125	53.565	125	53.086	125	54.801	125	49.928	125	52.314	125	53.217	125	53.260
206	52.830	206	52.488	206	45.911	206	49.013	206	55.416	206	48.369	206	48.626	206	49.008
236	52.818	236	51.951	236	56.229	236	55.568	236	56.532	236	56.707	236	56.988	236	56.745
158	52.766	158	52.045	158	50.688	158	51.605	158	50.304	158	50.121	158	52.558	158	52.211
230	52.602	230	52.165	230	48.900	230	47.756	230	59.998	230	56.024	230	57.505	230	57.391
213	52.411	213	51.929	213	53.472	213	53.011	213	50.001	213	50.306	213	51.402	213	51.388
132	52.385	132	51.700	132	56.893	132	56.502	132	63.791	132	67.430	132	54.413	132	54.426
137	52.337	137	53.021	137	52.980	137	54.633	137	49.959	137	53.226	137	54.959	137	54.914
226	51.620	226	52.537	226	53.549	226	54.298	226	54.554	226	55.705	226	57.582	226	57.669
156	51.379	156	49.437	156	49.981	156	46.817	156	50.977	156	48.778	156	46.694	156	46.837
147	51.006	147	51.569	147	53.259	147	55.374	147	51.160	147	53.262	147	52.934	147	52.860
126	50.792	126	50.657	126	52.828	126	51.397	126	49.565	126	48.221	126	48.763	126	47.447
159	50.455	159	50.556	159	43.053	159	42.775	159	42.065	159	40.607	159	42.030	159	41.109
166	50.386	166	49.625	166	54.708	166	55.418	166	47.649	166	44.807	166	48.986	166	48.685
149	50.333	149	49.565	149	52.289	149	51.988	149	50.482	149	50.440	149	50.901	149	51.146
136	50.069	136	50.045	136	46.192	136	48.655	136	46.886	136	50.099	136	50.344	136	50.137
114	49.928	114	49.122	114	49.144	114	48.647	114	49.641	114	48.509	114	47.482	114	47.447
225	49.912	225	48.829	225	48.829	225	49.608	225	51.985	225	51.087	225	47.256	225	47.148
131	49.798	131	49.546	131	53.653	131	52.535	131	50.702	131	49.816	131	53.597	131	53.683
153	49.601	153	50.334	153	46.128	153	48.700	153	49.679	153	49.142	153	49.022	153	48.834
219	49.542	219	48.694	219	49.480	219	49.255	219	48.455	219	46.986	219	48.379	219	48.023
827	49.186	827	50.938	827	47.042	827	49.599	827	49.379	827	51.312	827	49.463	827	50.311
129	49.132	129	48.702	129	49.641	129	43.313	129	46.443	129	47.687	129	45.065	129	45.171
186	48.971	186	51.929	186	44.437	186	45.662	186	44.252	186	46.950	186	46.904	186	46.918
263	48.850	263	48.405	263	52.054	263	51.781	263	49.864	263	49.299	263	53.617	263	53.954
106	48.592	106	48.011	106	51.076	106	49.630	106	47.406	106	45.153	106	44.297	106	44.929
177	48.528	177	49.662	177	50.575	177	52.332	177	49.673	177	53.050	177	52.748	177	52.760
265	47.596	265	47.066	265	48.930	265	47.426	265	45.801	265	46.748	265	52.534	265	52.562
235	47.533	235	46.634	235	47.479	235	45.451	235	47.345	235	45.818	235	44.924	235	44.687
168	47.414	168	46.071	168	43.081	168	42.616	168	45.156	168	44.928	168	46.985	168	46.958
185	47.317	185	47.313	185	46.328	185	44.657	185	46.396	185	45.333	185	42.463	185	42.291
211	46.762	211	48.015	211	46.067	211	48.184	211	46.865	211	48.127	211	48.416	211	48.346
229	46.741	229	47.715	229	46.685	229	47.329	229	48.574	229	50.355	229	49.163	229	49.423
142	46.422	142	45.538	142	42.391	142	40.945	142	43.376	142	40.117	142	41.945	142	41.775
189	46.091	189	44.454	189	48.594	189	43.401	189	50.071	189	47.893	189	41.408	189	42.404
150	46.021	150	47.478	150	45.958	150	45.526	150	44.941	150	45.229	150	47.106	150	46.789
173	45.875	173	44.964	173	46.772	173	43.877	173	48.658	173	46.847	173	44.116	173	43.856

TABLE 12
COMPARISON OF MATH MODELS
(ARRANGED BY DALLAS FULL)

DALLAS		HLM		DALLAS		HLM		DALLAS		HLM		HLM		HLM	
ID	FULL	ID	FULL	ID	MC	ID	MC	ID	MCL	ID	MCL	ID	MCC01	ID	MCC02
145	45.485	145	47.621	145	45.505	145	48.135	145	44.970	145	47.853	145	46.383	145	46.700
181	45.360	181	44.829	181	44.797	181	43.846	181	48.208	181	46.766	181	44.099	181	44.276
209	45.128	209	45.606	209	46.288	209	45.958	209	45.232	209	45.881	209	46.516	209	46.922
101	44.961	101	46.082	101	45.718	101	45.825	101	43.661	101	43.967	101	43.950	101	43.602
198	44.790	198	44.889	198	47.453	198	45.993	198	48.968	198	48.154	198	38.821	198	38.083
105	43.840	105	42.810	105	44.537	105	42.153	105	42.878	105	40.090	105	41.864	105	42.025
264	43.555	264	44.713	264	47.620	264	49.193	264	48.500	264	51.096	264	40.446	264	40.480
170	43.121	170	42.945	170	43.416	170	41.051	170	45.654	170	43.140	170	43.239	170	42.912
116	43.0	116	42.964	116	44.839	116	44.415	116	45.446	116	44.996	116	43.158	116	43.417
175	43.016	175	44.570	175	46.784	175	46.310	175	46.761	175	46.325	175	45.506	175	45.292
204	42.849	204	43.733	204	46.372	204	46.566	204	45.804	204	39.138	204	48.290	204	47.935
130	42.790	130	44.563	130	46.327	130	47.624	130	46.159	130	48.594	130	46.981	130	47.346
187	42.690	187	42.424	187	46.145	187	45.495	187	42.647	187	39.911	187	45.785	187	45.276
121	42.269	121	42.724	121	43.248	121	43.383	121	41.481	121	41.671	121	40.482	121	40.117
193	42.205	193	54.068	193	47.795	193	48.453	193	53.961	193	52.035	193	53.278	193	53.966
157	42.062	157	42.867	157	39.984	157	41.188	157	36.047	157	37.453	157	42.968	157	42.864
120	42.050	120	40.150	120	41.148	120	36.775	120	43.103	120	39.282	120	39.270	120	39.080
163	41.605	163	43.272	163	42.939	163	41.756	163	43.982	163	44.057	163	39.795	163	40.254
267	41.439	267	43.625	267	43.714	267	42.978	267	39.856	267	39.601	267	40.405	267	39.548
217	41.378	217	41.163	217	46.033	217	44.697	217	40.521	217	38.954	217	38.167	217	38.293
174	41.184	174	40.379	174	36.801	174	34.769	174	42.170	174	40.252	174	39.322	174	39.128
197	41.019	197	42.266	197	37.037	197	40.306	197	41.242	197	43.491	197	41.315	197	42.235
190	40.889	190	41.215	190	38.391	190	40.571	190	38.122	190	39.928	190	40.959	190	40.819
127	39.602	127	37.621	127	41.901	127	39.230	127	42.959	127	40.194	127	38.498	127	38.467
212	39.402	212	39.752	212	39.308	212	38.406	212	39.120	212	38.635	212	37.366	212	37.043
220	37.950	220	40.082	220	36.256	220	37.837	220	38.337	220	38.217	220	35.855	220	35.752
117	36.836	117	39.733	117	35.472	117	37.524	117	35.914	117	37.161	117	39.803	117	40.318
250	36.418	250	34.911	250	40.336	250	35.439	250	39.080	250	35.018	250	35.337	250	35.381
188	36.130	188	38.998	188	34.962	188	37.185	188	31.472	188	34.776	188	36.388	188	36.938
161	35.062	161	35.238	161	33.829	161	32.935	161	34.641	161	35.665	161	38.239	161	38.507
112	34.791	112	36.435	112	38.197	112	37.961	112	35.496	112	36.658	112	38.898	112	38.636
171	33.666	171	38.637	171	30.906	171	33.619	171	34.244	171	34.690	171	41.755	171	41.755
195	33.346	195	36.694	195	32.787	195	37.952	195	26.436	195	29.376	195	38.797	195	38.923
144	32.737	144	32.453	144	34.104	144	33.376	144	34.778	144	34.592	144	30.661	144	31.052
232	31.950	232	32.247	232	37.999	232	35.038	232	35.952	232	37.458	232	33.862	232	34.271
133	31.945	133	33.920	133	29.613	133	29.343	133	33.971	133	33.496	133	33.111	133	32.972
124	28.288	124	27.845	124	23.287	124	19.635	124	27.586	124	24.727	124	26.778	124	26.429
215	27.678	215	34.086	215	25.742	215	29.422	215	28.161	215	30.692	215	27.024	215	27.288
251	20.998	251	33.091	251	22.241	251	32.093	251	22.158	251	29.592	251	30.237	251	29.588

TABLE 12
COMPARISON OF MATH MODELS
(ARRANGED BY DALLAS FULL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
192	73.220	192	73.188	192	73.192	192	73.645	192	73.096	192	78.337	192	58.930	192	54.836
128	73.638	128	73.406	128	73.204	128	71.080	128	72.398	128	68.689	128	61.615	128	53.490
222	71.349	222	71.598	222	72.432	222	71.311	222	71.268	222	73.209	222	59.904	222	54.148
113	74.616	113	74.871	113	74.683	113	68.766	113	67.618	113	67.371	113	58.215	113	59.413
205	70.485	205	70.914	205	70.400	205	60.230	205	61.450	205	59.337	205	55.488	205	51.914
262	63.720	262	64.405	262	65.938	262	63.817	262	64.269	262	66.629	262	55.089	262	48.749
148	64.073	148	63.548	148	62.695	148	67.495	148	67.328	148	65.496	148	55.039	148	56.335
207	64.662	207	65.478	207	64.642	207	66.673	207	67.404	207	65.146	207	54.754	207	54.116
104	63.213	104	62.917	104	62.829	104	63.721	104	62.764	104	63.445	104	55.754	104	52.676
115	70.668	115	70.558	115	71.420	115	70.668	115	70.530	115	73.202	115	59.420	115	52.820
218	60.470	218	61.084	218	60.497	218	66.817	218	66.263	218	62.936	218	56.226	218	54.893
169	59.979	169	60.457	169	60.834	169	61.538	169	61.185	169	60.875	169	52.075	169	55.081
200	56.842	200	55.833	200	55.364	200	53.580	200	54.698	200	51.303	200	50.054	200	53.255
214	59.403	214	58.240	214	57.729	214	60.398	214	61.642	214	61.112	214	53.446	214	51.213
233	65.534	233	65.389	233	64.418	233	66.649	233	66.085	233	67.152	233	51.218	233	60.615
237	64.041	237	63.289	237	63.077	237	62.200	237	62.509	237	64.171	237	54.887	237	50.214
178	61.967	178	60.886	178	61.557	178	58.740	178	58.432	178	61.614	178	53.915	178	51.747
164	62.401	164	62.897	164	62.557	164	61.556	164	62.086	164	63.180	164	56.558	164	48.489
167	55.925	167	55.024	167	55.734	167	60.116	167	59.142	167	56.838	167	55.803	167	50.404
203	53.807	203	53.540	203	54.531	203	60.610	203	60.356	203	58.078	203	50.535	203	57.245
224	55.085	224	54.931	224	53.373	224	47.127	224	46.108	224	51.873	224	47.638	224	57.425
210	55.263	210	54.434	210	53.438	210	55.438	210	55.590	210	55.641	210	54.019	210	49.340
216	55.154	216	53.382	216	53.174	216	48.703	216	49.239	216	52.456	216	51.910	216	46.362
108	60.032	108	59.923	108	58.485	108	68.973	108	69.318	108	62.076	108	57.961	108	54.449
202	59.407	202	60.097	202	61.366	202	48.944	202	49.968	202	48.898	202	49.354	202	51.873
140	62.134	140	61.926	140	62.817	140	61.976	140	62.864	140	64.420	140	57.427	140	47.851
119	57.820	119	58.730	119	59.619	119	64.006	119	63.473	119	62.129	119	53.449	119	56.231
828	56.793	828	57.419	828	54.962	828	47.748	828	46.344	828	52.227	828	46.290	828	63.285
194	55.779	194	56.675	194	57.729	194	52.816	194	53.040	194	51.875	194	54.467	194	49.876
180	53.729	180	53.515	180	52.191	180	52.876	180	53.610	180	51.288	180	52.429	180	52.163
228	61.675	228	62.569	228	61.907	228	64.333	228	64.025	228	63.244	228	56.006	228	52.717
110	56.071	110	55.979	110	56.726	110	49.586	110	50.783	110	51.099	110	51.258	110	51.524
118	56.980	118	56.335	118	56.071	118	57.873	118	58.614	118	55.104	118	49.373	118	55.230
183	55.957	183	55.935	183	56.872	183	55.776	183	55.837	183	58.033	183	49.431	183	54.011
199	50.268	199	51.756	199	52.146	199	56.586	199	56.763	199	53.588	199	51.832	199	53.640
152	55.186	152	55.154	152	53.865	152	53.082	152	53.287	152	55.860	152	51.757	152	49.286
139	55.799	139	55.421	139	54.856	139	55.373	139	54.268	139	52.680	139	54.167	139	47.969
184	50.593	184	51.371	184	52.203	184	45.586	184	47.370	184	44.820	184	51.699	184	46.609
256	53.510	256	53.155	256	52.926	256	52.894	256	53.181	256	52.743	256	52.717	256	47.226
201	51.879	201	51.744	201	52.178	201	49.235	201	50.930	201	47.401	201	52.429	201	49.602

TABLE 12
COMPARISON OF MATH MODELS
(ARRANGED BY DALLAS FULL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
109	57.597	109	57.237	109	56.185	109	51.969	109	50.805	109	51.743	109	53.393	109	48.451
182	55.446	182	55.676	182	58.059	182	54.180	182	54.242	182	54.844	182	51.822	182	53.569
162	47.379	162	48.301	162	47.326	162	53.265	162	52.641	162	47.456	162	50.867	162	57.212
125	51.583	125	51.003	125	52.016	125	51.129	125	50.544	125	48.809	125	46.866	125	54.337
206	47.833	206	47.892	206	47.282	206	46.238	206	45.516	206	41.066	206	49.716	206	50.121
236	57.629	236	56.986	236	56.705	236	52.197	236	52.635	236	53.571	236	53.029	236	50.845
158	52.654	158	53.378	158	51.613	158	54.868	158	54.407	158	56.440	158	50.200	158	52.412
230	56.639	230	56.740	230	58.485	230	48.677	230	47.034	230	57.175	230	48.644	230	56.368
213	52.654	213	52.452	213	52.638	213	47.851	213	48.435	213	49.104	213	50.664	213	51.271
132	55.507	132	54.927	132	55.055	132	54.317	132	53.478	132	54.926	132	50.096	132	54.553
137	54.849	137	54.203	137	55.080	137	48.738	137	47.670	137	50.728	137	53.168	137	46.930
226	57.284	226	57.249	226	56.348	226	63.265	226	63.020	226	61.488	226	54.761	226	49.508
156	46.271	156	47.112	156	47.021	156	50.776	156	51.075	156	49.529	156	47.981	156	52.608
147	52.906	147	51.505	147	51.536	147	58.106	147	56.794	147	55.607	147	53.291	147	52.789
126	44.798	126	43.730	126	45.254	126	47.987	126	47.307	126	46.323	126	49.918	126	51.031
159	40.760	159	41.582	159	39.934	159	43.920	159	43.831	159	40.577	159	46.236	159	54.386
166	47.115	166	47.148	166	46.058	166	47.502	166	47.707	166	45.207	166	47.401	166	56.432
149	51.676	149	51.760	149	50.342	149	47.095	149	46.974	149	47.340	149	49.398	149	50.060
136	50.268	136	50.809	136	52.073	136	52.003	136	52.442	136	56.290	136	51.745	136	47.280
114	48.101	114	47.456	114	47.773	114	52.937	114	53.046	114	53.216	114	48.143	114	51.146
225	48.421	225	48.176	225	47.936	225	43.266	225	42.862	225	43.093	225	48.641	225	47.107
131	53.502	131	54.001	131	56.860	131	53.484	131	54.172	131	55.165	131	52.937	131	48.472
153	46.997	153	47.302	153	47.802	153	50.896	153	51.155	153	48.149	153	47.671	153	56.707
219	51.339	219	51.444	219	52.963	219	43.892	219	43.462	219	51.367	219	49.472	219	47.791
827	50.166	827	46.800	827	50.045	827	48.757	827	48.153	827	52.703	827	47.340	827	54.456
129	45.301	129	44.895	129	44.413	129	45.924	129	45.618	129	41.086	129	49.430	129	48.808
186	47.362	186	47.379	186	47.143	186	49.124	186	48.698	186	48.715	186	51.066	186	44.448
263	54.107	263	53.916	263	52.796	263	59.300	263	59.523	263	57.067	263	52.094	263	51.770
106	44.992	106	44.693	106	43.815	106	45.785	106	45.925	106	42.124	106	47.113	106	51.151
177	52.646	177	53.083	177	51.073	177	48.607	177	48.635	177	47.825	177	51.534	177	46.821
265	53.060	265	53.050	265	50.671	265	43.340	265	43.720	265	50.039	265	48.366	265	47.656
235	46.750	235	46.509	235	47.371	235	42.180	235	41.829	235	44.751	235	46.905	235	49.297
168	47.135	168	48.176	168	48.651	168	47.873	168	48.363	168	50.711	168	49.975	168	51.302
185	43.174	185	43.256	185	43.990	185	47.153	185	46.704	185	47.145	185	49.477	185	47.054
211	48.369	211	48.515	211	46.383	211	50.146	211	49.548	211	48.677	211	48.295	211	51.426
229	49.343	229	49.867	229	47.212	229	45.178	229	46.410	229	44.660	229	50.620	229	48.504
142	42.416	142	42.104	142	42.369	142	48.810	142	48.871	142	48.967	142	43.507	142	52.319
189	42.614	189	41.909	189	41.434	189	50.058	189	52.613	189	47.615	189	48.959	189	48.126
150	47.188	150	47.237	150	48.159	150	46.093	150	45.525	150	47.100	150	51.481	150	44.334
173	43.734	173	45.995	173	44.226	173	47.447	173	47.253	173	46.345	173	48.057	173	49.989

TABLE 12
COMPARISON OF MATH MODELS
(ARRANGED BY DALLAS FULL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
145	46.595	145	47.176	145	48.765	145	48.701	145	48.679	145	49.664	145	50.315	145	47.650
181	44.270	181	44.450	181	45.172	181	48.910	181	48.643	181	48.920	181	50.297	181	47.714
209	46.445	209	46.719	209	47.001	209	55.591	209	55.401	209	55.393	209	50.267	209	49.751
101	43.653	101	44.640	101	45.026	101	48.275	101	48.003	101	47.313	101	49.373	101	48.706
198	37.002	198	37.751	198	38.061	198	47.443	198	46.990	198	42.472	198	46.955	198	52.938
105	41.121	105	41.149	105	41.605	105	42.318	105	42.180	105	43.341	105	48.174	105	47.733
264	41.563	264	41.218	264	40.133	264	42.739	264	42.384	264	39.265	264	49.714	264	45.014
170	40.853	170	39.341	170	39.349	170	40.909	170	41.171	170	37.345	170	49.092	170	46.117
116	43.532	116	44.235	116	45.315	116	44.849	116	44.500	116	42.863	116	52.912	116	43.324
175	46.802	175	46.129	175	46.388	175	45.677	175	45.627	175	47.552	175	49.469	175	46.572
204	47.780	204	48.176	204	46.091	204	50.191	204	49.772	204	48.497	204	50.836	204	46.582
130	47.464	130	48.378	130	47.046	130	51.615	130	51.691	130	52.177	130	50.928	130	48.077
187	42.375	187	42.035	187	42.096	187	41.984	187	41.254	187	38.923	187	49.833	187	48.287
121	41.843	121	41.444	121	41.475	121	42.639	121	42.897	121	42.321	121	47.675	121	47.605
193	53.823	193	53.839	193	54.864	193	48.163	193	48.138	193	51.139	193	46.333	193	58.149
157	43.146	157	43.653	157	44.474	157	42.537	157	42.143	157	45.154	157	48.363	157	45.848
120	39.612	120	40.744	120	41.905	120	40.425	120	40.074	120	39.973	120	45.614	120	50.507
163	39.555	163	39.446	163	38.788	163	41.206	163	41.571	163	38.688	163	50.102	163	42.531
267	39.916	267	40.053	267	41.040	267	45.575	267	45.016	267	46.784	267	47.145	267	48.358
217	37.984	217	37.112	217	38.719	217	37.752	217	38.039	217	37.960	217	46.946	217	44.854
174	38.512	174	39.502	174	38.146	174	35.577	174	35.547	174	35.366	174	45.918	174	48.250
197	41.304	197	42.071	197	42.226	197	42.259	197	43.442	197	42.168	197	46.037	197	48.124
190	41.332	190	41.982	190	40.323	190	33.710	190	34.315	190	36.779	190	47.228	190	46.749
127	38.686	127	38.649	127	39.780	127	45.211	127	44.829	127	45.881	127	55.274	127	40.124
212	36.649	212	36.574	212	35.611	212	33.440	212	33.418	212	29.774	212	42.945	212	51.844
220	37.311	220	37.342	220	37.610	220	38.719	220	38.155	220	40.098	220	44.400	220	49.276
117	39.774	117	39.430	117	38.459	117	34.089	117	34.756	117	33.602	117	48.191	117	45.249
250	35.821	250	35.194	250	34.810	250	42.090	250	43.731	250	41.651	250	48.277	250	41.934
188	36.515	188	37.075	188	39.248	188	33.374	188	33.919	188	38.373	188	46.213	188	46.478
161	38.670	161	38.192	161	38.252	161	36.288	161	35.912	161	38.430	161	46.379	161	46.328
112	38.918	112	39.956	112	42.291	112	40.560	112	40.903	112	42.947	112	47.224	112	45.926
171	40.484	171	39.337	171	39.658	171	35.768	171	35.208	171	39.160	171	45.524	171	51.182
195	38.544	195	39.883	195	40.430	195	37.433	195	36.675	195	37.713	195	44.171	195	52.377
144	31.183	144	30.858	144	31.315	144	31.262	144	30.895	144	29.968	144	38.767	144	47.508
232	35.302	232	35.303	232	34.822	232	40.514	232	39.950	232	39.843	232	43.462	232	48.890
133	33.833	133	33.523	133	33.091	133	34.297	133	34.113	133	34.544	133	44.639	133	46.166
124	25.875	124	25.307	124	24.785	124	25.330	124	25.974	124	26.526	124	41.827	124	41.551
215	28.752	215	28.151	215	28.792	215	25.451	215	25.409	215	27.289	215	39.178	215	47.097
251	30.509	251	30.558	251	30.295	251	34.254	251	34.895	251	33.794	251	40.606	251	47.957

TABLE 13
COMPARISON OF READING MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
205	77.631	205	75.513	205	74.577	115	75.029	115	76.032	115	77.444	222	78.542	222	78.714
115	73.640	119	74.416	115	73.743	205	74.105	205	74.652	222	75.096	115	78.042	115	77.866
119	71.729	222	73.767	119	69.128	222	73.343	222	69.205	205	74.046	205	77.064	205	77.067
222	69.296	115	72.778	222	68.114	119	71.502	113	67.887	200	69.383	119	70.694	119	70.640
210	69.017	210	68.319	200	68.033	200	67.250	200	67.473	210	69.014	192	67.625	192	67.500
192	68.416	192	66.479	192	66.348	162	65.831	210	67.185	119	66.226	113	66.027	200	65.804
200	67.063	203	65.274	210	64.264	203	65.609	119	66.418	192	65.986	200	65.408	113	64.795
114	66.574	200	64.329	162	63.739	210	64.951	192	65.906	113	64.904	114	64.739	114	64.669
159	64.492	114	64.329	113	63.736	113	64.145	114	64.352	237	63.910	210	64.042	210	63.926
113	63.447	159	64.070	114	63.521	114	63.819	159	62.213	114	63.414	256	64.000	256	63.835
203	62.960	828	63.803	203	61.987	192	63.383	162	61.288	202	62.172	202	61.220	202	61.704
162	61.885	113	62.569	167	61.669	167	62.555	237	60.600	256	61.867	236	61.156	236	61.193
202	61.747	162	61.696	216	61.599	828	62.437	218	60.573	828	60.761	128	60.952	128	60.751
224	61.377	202	61.559	204	61.352	128	60.921	184	60.037	150	60.745	226	59.889	226	59.861
158	60.131	256	60.577	202	60.494	256	60.218	202	59.944	184	60.601	237	59.636	237	59.405
827	60.083	125	60.289	158	60.277	202	59.997	827	59.401	128	60.329	184	58.911	157	58.648
184	59.600	827	59.777	233	59.895	237	59.464	204	59.138	827	59.968	157	58.643	184	58.634
156	59.418	156	59.575	827	59.414	827	59.339	150	58.722	162	59.840	158	57.686	131	57.723
125	59.401	167	58.752	128	58.829	157	59.265	128	57.844	193	59.503	131	57.686	136	57.513
256	59.120	194	58.074	157	58.718	233	59.191	158	57.581	159	58.550	136	57.602	214	57.450
233	58.233	128	57.994	184	58.217	183	58.193	125	57.488	109	57.917	214	57.341	158	57.429
116	58.188	158	57.922	183	58.112	236	57.882	256	57.380	236	57.260	164	57.151	167	57.408
237	58.114	237	57.634	116	57.998	158	57.697	129	57.298	226	57.212	167	56.905	164	56.651
167	57.697	224	57.165	125	57.974	129	57.475	230	57.140	129	57.204	177	56.468	177	56.455
164	57.446	233	56.934	256	57.819	125	56.359	216	56.929	157	57.051	109	56.454	109	56.286
183	56.579	236	56.804	225	57.808	184	56.314	226	56.712	218	56.947	263	56.095	263	56.209
194	56.476	183	56.414	211	57.638	109	56.203	236	56.494	125	56.515	162	55.905	203	55.943
262	56.213	184	56.306	237	57.498	211	55.996	109	56.483	264	56.210	194	55.856	194	55.929
236	56.051	226	56.292	129	57.397	218	55.930	156	56.301	156	56.090	230	55.490	827	55.873
128	56.010	211	55.772	236	57.181	219	55.886	157	56.300	158	55.809	203	55.300	262	55.747
177	55.226	218	55.700	219	56.271	264	55.767	116	56.242	136	55.777	262	55.279	162	55.642
204	54.594	186	55.433	159	56.259	262	55.405	198	56.145	214	55.337	827	55.180	230	55.347
226	54.376	164	55.375	169	56.048	159	55.331	264	55.539	186	55.072	218	55.040	218	55.172
157	54.349	177	55.195	109	55.898	226	54.954	167	55.208	262	55.024	186	54.948	150	55.137
828	54.203	148	55.108	264	55.426	224	54.939	263	55.075	110	54.728	233	54.892	193	55.039
218	53.967	262	55.007	263	55.394	126	54.695	164	55.034	104	54.672	150	54.786	186	54.934
131	53.776	136	54.964	131	55.053	204	54.599	224	54.963	178	54.568	193	54.469	233	54.913
129	53.604	157	54.805	126	55.040	169	54.407	110	54.840	182	54.495	125	54.188	211	54.002
206	53.558	166	54.661	218	54.880	150	54.200	108	54.754	263	54.439	116	54.160	125	53.932
153	53.524	153	54.185	214	54.474	194	54.089	225	54.263	167	54.415	211	54.089	828	53.910

TABLE 13
COMPARISON OF READING MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	DALLAS FULL
166	53.494
136	53.463
212	53.400
186	53.365
150	53.098
219	53.000
207	52.899
148	52.553
214	52.299
264	52.131
110	52.129
263	52.042
126	52.024
198	51.898
201	51.247
109	51.198
182	51.055
216	50.611
105	50.236
118	50.148
199	50.120
228	49.855
149	49.687
145	49.502
175	49.474
137	49.275
120	49.242
104	49.009
235	48.979
225	48.928
178	48.905
230	48.416
147	48.346
106	47.619
139	47.616
211	47.616
193	47.551
140	47.421
108	47.206
267	47.187

ID	HLM FULL
131	53.997
150	53.774
129	53.730
116	53.456
207	53.175
264	53.095
212	52.403
228	52.381
109	52.121
206	52.085
126	52.035
193	51.797
219	51.486
201	51.486
110	51.422
199	51.075
198	50.815
182	50.686
137	50.613
263	50.592
120	50.570
230	50.361
145	50.339
105	50.080
214	49.986
178	49.553
216	49.538
104	49.380
149	48.882
204	48.774
147	48.507
175	48.326
139	48.269
235	48.088
106	47.764
118	47.684
140	47.619
267	46.703
169	45.693
225	45.650

ID	DALLAS MC
164	54.397
226	54.361
193	53.896
150	53.743
177	53.628
262	53.550
182	53.159
108	53.069
110	52.925
198	52.900
194	52.886
156	52.479
175	52.118
166	51.913
207	51.644
120	51.570
104	51.560
224	51.525
186	50.542
178	50.515
199	50.185
217	49.905
212	49.834
148	49.695
149	49.611
130	49.541
201	48.895
228	48.722
145	48.526
105	48.414
153	48.131
174	48.042
140	47.897
206	47.672
235	47.422
267	47.320
118	47.138
147	47.099
139	46.901
136	46.632

ID	HLM MC
263	54.007
216	53.793
193	53.763
148	53.653
120	53.623
131	53.519
198	53.157
207	53.142
186	52.980
116	52.906
164	52.773
104	52.558
214	52.299
166	52.203
182	52.137
156	52.011
178	51.981
175	51.967
177	51.360
225	51.360
110	51.153
212	50.991
201	50.806
228	50.599
108	50.577
130	50.547
199	50.185
136	50.170
145	49.845
217	49.578
149	48.972
153	48.824
140	47.841
105	47.782
235	47.419
267	47.175
118	46.606
229	46.576
139	46.547
147	46.133

ID	DALLAS MCL
828	54.097
131	53.902
177	53.865
233	53.401
148	53.175
193	53.146
182	53.043
186	52.870
178	52.829
262	52.501
175	52.458
206	52.427
194	52.320
219	52.319
214	52.300
201	51.588
136	51.554
183	51.413
104	51.359
171	51.322
211	51.057
203	51.022
126	50.715
207	50.695
139	50.190
199	50.142
153	50.074
212	49.815
137	49.175
120	48.703
105	48.666
149	48.592
140	48.480
181	48.200
228	47.702
145	47.435
217	47.111
235	46.808
118	46.438
169	46.034

ID	HLM MCL
233	54.119
216	53.935
224	53.750
131	53.686
164	53.518
201	53.502
116	53.390
194	53.181
148	52.572
230	52.452
177	51.891
212	51.755
137	51.755
207	51.491
108	51.451
211	51.322
198	50.794
175	50.753
203	50.641
153	50.337
139	50.096
105	49.976
149	49.560
199	49.199
219	49.015
206	48.782
120	48.574
145	48.518
183	48.446
126	48.406
225	47.885
229	47.532
188	46.987
217	46.907
228	46.827
118	46.699
181	46.643
190	46.130
204	46.034
130	45.858

ID	HLM MCC01
207	53.829
224	53.794
219	53.456
159	53.378
216	53.125
156	53.090
201	52.421
183	52.414
228	52.287
828	52.154
178	52.133
110	51.907
105	51.858
206	51.302
139	50.971
264	50.852
204	50.753
126	50.746
140	50.591
169	50.584
149	50.338
166	50.253
145	50.176
153	49.958
182	49.796
188	49.380
129	49.324
148	49.296
175	49.254
199	49.240
120	49.078
137	48.817
171	48.289
104	48.106
187	47.508
229	47.177
267	46.769
225	46.487
118	46.438
161	46.136

ID	HLM MCC02
207	53.847
224	53.630
116	53.469
219	53.266
156	53.245
216	53.175
159	52.600
201	52.572
183	52.446
178	52.144
228	52.116
105	51.990
110	51.668
126	51.408
206	51.310
139	50.960
204	50.869
140	50.623
264	50.595
169	50.532
182	50.399
149	50.189
145	50.147
166	50.049
153	49.691
188	49.425
148	49.327
129	49.292
175	49.292
199	49.285
120	49.089
137	48.689
171	48.107
104	48.093
187	47.925
229	47.091
118	46.965
267	46.530
225	46.397
161	46.089

TABLE 13
COMPARISON OF READING MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
163	46.781	180	45.642	229	46.451	137	45.667	250	45.799	171	45.697	190	46.079	190	46.033
180	46.372	108	45.224	181	46.299	187	45.342	174	45.556	235	45.601	212	45.861	232	45.886
169	45.799	232	44.675	163	45.740	181	44.957	147	45.489	161	45.449	108	45.727	106	45.858
174	45.653	130	44.437	171	44.228	171	44.654	229	44.916	140	45.369	232	45.565	108	45.738
217	45.299	217	44.142	106	44.173	121	43.981	161	44.658	106	45.193	106	45.495	265	45.381
229	44.665	174	43.824	137	44.000	206	43.826	163	44.596	250	45.048	265	45.425	212	45.262
250	44.560	187	43.810	121	43.979	106	43.589	232	44.574	166	44.744	235	45.242	235	45.143
130	44.152	229	43.795	828	43.944	185	42.842	166	44.161	174	44.496	198	45.129	198	45.002
181	43.922	188	43.781	250	43.932	180	42.828	190	43.991	187	43.702	130	44.812	180	44.610
232	43.804	181	43.564	144	43.290	163	42.155	106	43.783	180	43.662	180	44.650	130	44.547
121	43.353	250	43.160	180	43.241	174	41.874	187	43.619	185	43.210	174	44.629	174	44.498
188	42.667	121	42.908	185	42.508	232	41.674	185	43.484	267	43.205	250	44.284	168	44.400
187	42.202	163	42.439	232	42.313	250	41.600	267	43.100	163	43.141	168	44.193	250	44.042
185	42.171	190	42.410	187	42.169	188	41.497	180	42.879	197	43.141	195	44.045	195	43.986
190	42.161	127	42.331	230	42.122	101	41.341	121	42.827	265	42.597	181	43.714	181	43.685
173	42.136	265	42.230	161	41.990	190	41.216	112	42.744	127	42.572	217	42.236	217	42.143
197	41.729	185	42.114	173	41.720	161	40.558	130	42.303	232	42.220	163	42.152	163	41.575
168	40.908	195	41.349	112	41.534	127	40.513	173	41.786	144	41.899	147	41.546	147	41.386
220	40.566	220	40.743	197	41.369	173	40.395	197	41.517	173	41.691	127	41.187	197	41.071
112	40.487	168	40.383	190	41.353	168	39.449	127	41.374	147	41.491	112	41.159	112	41.050
195	40.354	152	40.231	101	40.954	220	39.352	220	41.309	112	41.050	152	40.765	127	40.993
189	39.973	161	39.654	168	40.879	170	39.308	188	41.244	121	40.513	121	40.554	152	40.685
127	39.756	197	39.625	188	39.653	144	39.293	189	40.522	169	40.417	197	40.547	121	40.496
170	39.274	173	39.589	189	39.325	197	38.199	170	39.393	168	40.048	185	40.237	185	40.349
152	39.025	170	39.509	170	39.278	265	37.859	132	39.336	195	39.023	173	40.019	170	40.258
161	38.231	171	39.019	220	38.647	112	37.704	152	38.926	220	38.694	170	39.716	173	39.837
171	38.071	112	38.846	127	38.537	230	37.474	168	38.668	132	38.686	101	38.337	101	38.421
265	37.550	101	36.645	132	38.317	132	37.415	144	38.595	170	37.605	220	36.753	220	36.830
132	36.740	144	35.137	209	37.316	195	36.979	101	37.885	101	36.691	209	35.437	209	35.632
144	36.419	132	35.123	152	36.835	152	36.247	209	36.502	209	36.467	132	35.134	132	35.120
209	35.832	209	34.199	213	35.254	209	35.744	213	35.660	117	35.137	117	34.782	117	34.714
101	35.309	189	33.608	195	34.659	189	33.940	265	35.256	189	35.121	144	34.493	144	34.588
117	33.247	215	33.247	265	32.552	213	33.873	133	33.908	152	35.049	189	33.198	189	33.403
213	32.624	117	32.857	133	32.037	251	32.579	195	33.752	213	34.303	213	30.059	213	29.976
133	30.132	213	31.825	117	31.314	117	32.402	117	32.246	133	32.332	251	29.334	251	28.910
124	29.494	251	29.784	215	26.863	215	31.034	215	25.210	251	31.627	133	28.363	215	28.343
215	29.101	133	28.903	124	26.449	133	29.548	142	23.571	215	27.573	215	28.243	133	28.231
142	26.775	142	26.335	142	24.633	142	26.117	124	20.482	142	23.214	124	24.512	124	24.614
251	19.247	124	23.297	251	18.356	124	22.782	251	18.397	124	17.429	142	23.358	142	21.114

TABLE 13
COMPARISON OF READING MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
115	78.963	115	79.106	115	79.101	119	76.357	119	77.295	114	76.701	222	57.112	828	64.091
222	78.743	222	78.059	222	77.926	222	71.856	222	72.714	115	73.436	119	56.858	162	59.894
205	78.608	205	77.909	205	77.905	115	67.481	115	69.693	200	72.140	113	55.622	233	59.627
119	70.041	119	69.176	119	68.978	192	67.105	192	66.256	222	71.497	115	54.951	119	58.185
192	67.141	114	67.159	114	67.024	233	65.891	210	64.986	237	69.170	205	54.080	224	58.094
113	67.134	200	66.667	200	66.939	153	65.274	237	64.310	205	69.022	256	53.742	159	57.681
114	65.814	192	66.624	192	66.692	203	64.560	233	64.287	119	68.779	210	53.618	153	57.595
200	65.162	113	66.432	113	66.578	162	64.333	162	63.975	192	68.263	192	53.525	230	57.567
210	64.346	256	65.113	256	65.071	156	63.207	114	63.054	113	65.488	236	53.402	193	57.551
256	64.205	210	63.117	210	62.996	205	63.110	205	62.586	207	65.396	228	53.337	827	56.973
236	61.843	237	62.439	237	62.480	114	62.904	157	62.417	156	62.824	131	53.092	166	56.439
202	61.602	128	61.948	128	61.878	210	62.427	131	62.314	210	62.629	203	53.039	203	56.030
128	60.496	202	61.114	202	60.512	237	62.073	136	62.255	233	62.626	237	53.000	125	55.464
237	59.957	236	60.493	236	60.469	136	61.199	203	61.863	216	62.312	116	52.853	195	55.104
226	59.368	226	59.723	226	59.790	131	60.674	156	61.083	256	62.111	167	52.770	198	55.058
157	59.219	214	58.561	214	58.685	207	60.463	153	60.255	263	60.768	136	52.756	212	54.567
184	58.212	219	58.433	219	58.211	157	59.861	226	59.871	236	59.863	207	52.745	171	54.291
158	58.099	109	57.884	109	57.850	158	59.653	145	59.444	128	59.791	164	52.642	169	54.160
219	57.950	157	57.756	157	57.694	226	59.017	218	59.319	827	59.575	162	52.538	114	53.940
136	57.787	194	57.514	263	57.616	198	58.780	158	59.092	157	59.064	148	52.398	156	53.760
131	57.701	263	57.321	194	57.510	145	58.426	827	58.683	226	59.046	157	52.380	211	53.615
263	56.567	216	57.086	216	57.142	166	58.403	167	58.397	194	58.627	128	52.349	183	53.588
177	56.397	136	56.644	158	56.979	159	58.102	164	58.298	214	58.606	184	52.251	113	53.408
164	56.304	184	56.622	184	56.647	827	57.919	116	57.801	211	58.599	110	52.149	158	53.188
109	56.297	158	56.473	136	56.484	211	57.802	256	57.725	110	58.251	216	52.146	126	53.141
194	56.191	186	56.295	828	56.349	236	57.509	211	57.415	183	57.679	156	52.017	120	52.915
214	56.077	230	55.952	186	56.236	218	56.900	198	57.384	136	57.629	226	51.976	218	52.855
218	55.992	150	55.753	150	55.719	200	56.846	169	57.197	158	57.521	233	51.975	222	52.478
262	55.865	131	55.646	230	55.422	169	56.692	207	56.855	203	57.147	264	51.962	147	52.430
827	55.666	183	55.575	177	55.344	256	56.467	236	56.442	186	56.368	250	51.954	182	52.300
150	55.666	177	55.268	131	55.330	202	56.063	126	56.157	153	55.927	194	51.931	148	52.079
186	55.517	262	55.190	183	55.167	105	56.028	159	56.012	131	55.526	145	51.902	115	51.856
183	55.021	193	55.061	262	54.941	113	55.789	230	55.700	159	55.004	202	51.806	200	51.769
193	54.865	164	54.840	164	54.898	110	55.679	105	55.516	232	54.293	204	51.796	187	51.695
203	54.702	828	54.555	211	54.466	199	55.547	216	55.375	169	54.199	153	51.756	192	51.582
216	54.468	167	54.391	167	54.424	116	55.133	187	55.326	162	54.076	105	51.751	199	51.431
828	54.453	203	54.284	193	54.381	164	55.052	194	55.267	190	53.819	198	51.682	202	51.315
230	54.368	218	54.035	233	54.240	184	54.833	128	55.000	140	53.735	158	51.641	232	51.147
233	54.198	207	53.849	207	54.219	126	54.717	190	54.942	175	53.675	201	51.618	167	50.987
211	54.184	178	53.792	224	54.070	216	54.664	228	54.825	828	53.546	150	51.574	157	50.877

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TABLE 13
COMPARISON OF READING MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
207	53.836	233	53.735	218	53.999	230	54.611	200	54.617	150	53.358	130	51.502	210	50.860
116	53.801	156	53.714	156	53.801	228	54.406	202	54.138	166	52.864	218	51.267	118	50.842
178	53.283	211	53.714	203	53.751	167	54.357	186	54.089	118	52.484	109	51.204	263	50.722
162	53.255	201	53.650	178	53.546	182	54.288	184	53.677	145	52.407	159	51.134	205	50.557
224	53.234	224	53.521	201	53.489	190	53.952	110	53.632	228	52.368	108	51.110	206	50.519
201	52.950	264	53.386	264	53.440	194	53.745	166	53.501	218	52.296	262	51.069	228	50.128
156	52.773	139	52.937	116	53.093	171	53.723	199	53.160	105	52.207	187	51.027	220	50.104
167	52.595	116	52.702	139	52.852	148	53.581	182	52.694	230	52.022	140	51.017	110	50.064
159	52.269	110	52.516	110	52.314	128	53.553	204	52.652	201	51.891	190	50.978	236	49.922
110	51.773	827	52.488	228	52.222	193	53.108	171	52.400	262	51.846	126	50.923	144	49.906
228	51.773	175	52.181	175	52.109	187	52.917	224	52.148	178	51.643	169	50.902	219	49.818
125	51.716	228	52.160	169	52.024	195	52.903	113	52.014	202	51.617	166	50.856	237	49.805
264	51.716	169	51.918	162	51.897	112	52.779	130	51.985	224	51.368	120	50.837	180	49.782
175	51.142	162	51.675	140	51.762	188	52.403	147	51.969	164	51.166	229	50.815	145	49.780
105	51.113	140	51.639	159	51.571	224	52.237	183	51.813	116	50.404	180	50.814	129	49.741
139	51.014	125	51.604	125	51.189	130	52.049	263	51.374	188	50.138	214	50.809	215	49.677
149	50.943	159	50.991	827	50.778	183	51.699	120	51.218	193	49.661	199	50.792	190	49.503
204	50.766	105	50.791	105	50.580	263	51.415	177	51.118	187	49.545	177	50.767	104	49.490
140	50.709	137	50.349	206	50.460	120	51.313	188	51.056	219	49.407	217	50.740	149	49.431
182	50.106	206	50.335	137	50.389	229	51.220	195	50.632	108	49.243	137	50.648	174	49.375
145	49.979	129	50.157	129	50.325	125	50.851	148	50.394	112	48.510	188	50.645	235	49.373
169	49.922	145	49.843	149	50.014	204	50.628	127	50.347	167	48.399	230	50.602	207	49.341
206	49.893	204	49.786	204	49.943	108	50.560	229	50.044	229	48.154	186	50.574	194	49.288
120	49.794	149	49.615	145	49.653	186	50.329	150	49.746	204	48.050	200	50.372	197	49.286
129	49.503	120	49.479	225	49.582	147	49.616	112	49.558	161	48.002	175	50.308	105	49.263
148	48.979	225	49.458	120	48.973	197	49.472	193	49.452	182	47.963	161	50.284	106	49.246
188	48.901	182	49.444	166	48.711	232	49.443	125	49.420	180	47.810	152	50.263	226	49.195
137	48.475	188	48.688	182	48.619	173	49.017	108	49.340	184	47.682	193	50.245	173	49.108
225	48.170	126	48.196	118	48.194	180	48.901	140	49.271	264	47.675	101	50.187	132	49.099
166	48.135	166	48.189	104	48.180	828	47.985	264	49.185	195	47.663	182	50.179	109	49.059
126	47.730	104	48.161	232	48.102	129	47.422	180	48.056	106	47.564	178	50.092	108	48.877
235	47.496	118	48.032	188	48.095	177	47.324	232	47.972	173	47.421	232	50.079	204	48.811
118	47.489	232	47.847	126	47.904	127	47.062	181	47.918	129	47.327	170	49.939	142	48.736
153	47.298	235	47.776	199	47.755	150	46.988	219	47.587	109	47.234	106	49.925	168	48.673
199	47.277	199	47.769	235	47.423	140	46.965	262	47.222	265	47.158	149	49.899	136	48.589
267	47.085	161	47.319	161	47.317	181	46.757	109	47.132	127	46.914	211	49.875	188	48.511
229	47.043	267	47.063	267	46.736	106	46.595	129	46.986	235	46.904	163	49.801	161	48.493
232	46.922	153	46.756	108	46.587	149	46.360	828	46.871	199	46.238	181	49.768	229	48.314
190	46.574	148	46.436	148	46.531	161	45.892	175	46.702	198	46.164	263	49.757	101	48.274
171	46.447	108	46.250	106	46.531	264	45.860	197	46.478	250	46.122	112	49.751	131	48.127

TABLE 13
COMPARISON OF READING MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
104	46.397	187	46.172	153	46.524	152	45.694	173	46.105	267	46.109	827	49.602	267	48.024
161	46.312	106	46.001	187	46.106	118	45.341	137	46.020	189	45.921	168	49.527	209	48.015
108	46.206	171	45.744	229	46.014	219	45.340	152	45.380	130	45.818	129	49.493	130	47.991
106	45.965	190	45.644	190	45.816	178	45.049	178	45.283	120	45.736	173	49.478	121	47.957
265	45.575	229	45.537	171	45.533	212	45.023	206	45.197	148	45.619	171	49.475	181	47.956
212	44.837	195	45.238	195	45.172	175	44.957	161	45.137	171	45.578	114	49.451	264	47.814
187	44.709	250	44.183	180	44.485	217	44.581	149	44.994	126	45.362	265	49.436	256	47.755
130	44.596	180	44.176	265	44.350	206	44.482	101	44.893	177	44.472	206	49.339	178	47.728
168	44.475	265	43.948	250	44.251	262	44.437	106	44.729	137	44.394	224	49.251	128	47.573
198	44.064	198	43.506	130	43.692	265	43.731	201	44.260	152	43.901	147	49.225	175	47.477
250	43.802	130	43.441	174	43.685	201	43.650	104	43.624	197	43.697	195	49.203	251	47.470
174	43.731	121	43.277	212	43.572	250	43.544	170	42.966	149	43.258	104	49.038	152	47.443
181	43.603	212	43.242	198	43.381	101	43.518	209	42.890	121	43.181	219	48.940	214	47.403
195	43.546	174	43.206	121	43.267	137	43.152	118	42.755	185	42.824	197	48.832	201	47.354
180	42.993	168	43.192	168	42.928	109	43.016	214	42.608	139	42.548	139	48.699	225	47.318
121	42.639	163	42.116	163	42.184	174	42.746	217	42.585	163	42.394	125	48.480	216	47.250
217	41.908	181	42.001	181	41.901	235	42.711	235	42.047	181	41.339	174	48.413	184	47.209
185	41.518	185	41.852	185	41.689	214	42.641	265	41.974	125	41.023	235	48.059	177	47.178
112	41.468	127	40.818	127	40.945	168	42.333	250	41.928	174	40.857	183	48.039	112	47.172
147	41.256	147	40.483	147	40.443	209	42.102	212	41.490	147	40.855	225	47.976	116	47.145
152	41.135	112	40.141	152	40.287	189	41.326	189	41.190	206	39.458	117	47.892	213	47.095
127	41.007	152	40.077	220	39.813	170	40.699	174	40.957	217	39.435	121	47.543	186	47.051
163	40.632	220	39.841	173	39.664	104	39.881	168	40.956	101	38.470	212	47.502	164	46.836
197	39.880	197	39.613	197	39.629	121	39.638	121	40.594	212	38.320	209	47.356	137	46.652
173	39.561	173	39.015	112	39.466	144	39.002	185	39.444	104	38.071	828	46.861	185	46.644
220	38.830	217	38.651	101	38.503	163	37.881	139	38.580	142	37.834	185	46.624	150	46.567
170	38.745	101	38.544	217	38.298	267	37.703	163	37.916	220	36.885	118	46.445	139	46.503
101	38.511	170	38.223	170	38.093	185	36.860	267	37.770	225	36.043	133	46.332	170	46.422
132	36.575	132	37.083	132	37.024	139	35.443	144	36.523	168	35.988	144	46.290	189	46.342
144	35.291	189	34.680	189	34.943	220	34.588	220	36.171	209	35.633	213	45.770	265	46.284
209	34.873	209	34.531	209	34.475	225	32.559	225	35.134	170	35.477	267	45.382	133	46.195
117	33.944	117	34.081	117	34.284	213	32.559	215	31.696	215	34.134	132	44.652	117	45.244
189	33.384	144	33.925	144	33.385	215	32.048	213	30.614	144	34.130	220	44.605	262	45.222
213	31.426	213	31.864	213	31.828	142	32.037	142	29.889	132	32.528	189	44.319	217	45.209
215	30.235	215	31.166	215	30.801	117	31.094	117	29.825	117	31.543	215	43.600	140	44.354
251	30.129	251	29.925	251	29.980	132	29.887	132	29.575	251	31.081	127	42.635	163	43.529
133	29.341	133	29.405	133	29.577	133	29.426	133	28.322	213	30.540	124	42.056	250	42.312
124	23.930	124	24.907	124	24.968	251	24.061	251	24.324	133	30.470	251	40.425	124	41.684
142	23.902	142	24.422	142	24.239	124	16.181	124	16.700	124	27.457	142	38.668	127	39.624

TABLE 14
COMPARISON OF MATH MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	DALLAS FULL	ID	HLM FULL	ID	DALLAS MC	ID	HLM MC	ID	DALLAS MCL	ID	HLM MCL	ID	HLM MCC01	ID	HLM MCC02
192	73.507	192	74.486	128	72.583	128	73.179	128	72.020	128	74.065	113	74.051	128	73.749
128	72.642	128	73.045	205	71.323	222	71.310	205	71.348	192	71.819	128	73.659	192	73.499
222	70.316	113	68.673	113	70.235	113	70.605	113	69.828	222	71.756	192	73.259	113	72.716
113	69.875	222	68.444	222	68.180	192	69.335	222	69.464	113	69.640	222	71.764	222	71.470
205	69.373	115	65.367	104	66.883	205	68.215	192	68.980	115	68.499	115	69.771	115	69.997
262	68.430	207	65.311	115	66.520	115	68.092	115	65.659	205	67.888	205	69.480	205	69.445
148	66.581	205	65.288	148	65.826	148	67.739	237	65.050	132	67.430	233	65.895	233	66.153
207	66.065	148	65.213	192	65.718	104	67.342	207	64.140	237	65.836	207	64.364	207	64.297
104	65.337	262	64.973	164	64.484	169	64.649	108	64.120	104	64.654	148	64.263	104	64.277
115	64.779	104	63.438	262	64.194	164	63.190	214	64.120	233	64.425	104	64.246	148	63.861
218	62.887	218	61.273	207	63.355	828	62.317	148	64.106	828	64.254	262	63.959	237	63.595
169	62.168	169	60.995	169	62.439	207	62.189	132	63.791	108	63.711	237	63.539	262	63.466
200	61.419	233	60.282	237	62.193	233	61.863	164	63.460	207	63.509	164	62.383	164	62.687
214	61.199	200	58.942	218	61.779	237	61.845	218	63.340	148	63.437	140	62.092	140	62.082
233	60.895	203	58.856	167	61.625	228	61.404	104	63.135	164	61.896	228	61.745	228	61.893
237	60.485	140	58.774	200	61.524	108	60.845	233	62.976	214	61.891	178	61.001	178	60.783
178	60.135	828	58.732	118	60.853	218	60.796	262	62.057	218	61.438	218	60.459	214	60.707
164	59.828	228	58.350	233	60.549	262	60.668	200	61.587	203	60.984	214	60.399	169	60.348
167	59.618	202	58.173	228	60.169	167	59.870	230	59.998	200	60.193	169	60.237	218	59.916
203	59.197	178	58.031	108	60.168	118	59.562	203	59.943	262	59.403	167	59.675	202	59.609
224	59.195	237	57.850	119	59.611	200	59.544	119	59.609	224	58.378	108	59.538	108	59.529
210	59.146	167	57.547	214	58.921	119	58.812	224	59.098	118	58.221	202	58.798	167	59.190
216	58.507	194	57.479	178	58.449	202	58.495	828	58.601	202	58.019	119	58.451	119	58.557
108	58.117	214	57.426	110	58.324	178	58.486	167	58.290	110	57.044	226	57.582	226	57.669
202	57.739	108	57.306	210	58.119	203	57.935	178	58.090	236	56.707	230	57.505	109	57.653
140	57.694	210	57.077	202	58.084	140	57.618	118	58.087	119	56.658	109	57.461	200	57.443
119	57.556	216	56.417	203	57.779	183	57.256	110	57.736	139	56.420	200	57.024	230	57.391
828	57.424	110	55.993	183	57.425	180	56.855	202	57.091	140	56.370	236	56.988	236	56.745
194	57.385	118	55.783	180	57.378	110	56.837	140	56.789	167	56.343	110	56.826	118	56.612
180	57.380	183	55.745	216	56.966	162	56.665	201	56.637	178	56.307	118	56.119	828	56.459
228	57.357	164	55.667	132	56.893	210	56.648	236	56.532	109	56.078	194	55.690	110	55.946
110	57.200	119	55.430	236	56.229	132	56.502	109	56.444	230	56.024	139	55.654	139	55.761
118	56.756	139	55.306	140	56.091	214	56.366	210	56.023	169	55.975	224	55.593	182	55.644
183	55.376	180	55.212	139	56.061	182	56.357	180	55.778	226	55.705	180	55.302	194	55.479
199	54.976	256	55.205	199	55.714	139	55.991	139	55.576	194	55.669	210	55.117	224	55.362
152	54.885	184	54.135	162	54.854	194	55.885	206	55.416	180	55.598	828	55.064	180	55.196
139	54.778	193	54.068	194	54.711	236	55.568	256	55.025	210	55.023	137	54.959	210	55.107
184	54.730	199	53.922	166	54.708	166	55.418	228	54.908	183	54.919	182	54.757	137	54.914
256	54.660	224	53.820	182	54.518	147	55.374	169	54.705	201	54.879	152	54.692	203	54.829
201	53.973	125	53.565	256	53.666	125	54.801	226	54.554	228	54.497	216	54.583	152	54.672

TABLE 14
COMPARISON OF MATH MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

DALLAS		HLM		DALLAS		HLM		DALLAS		HLM		HLM		HLM	
ID	FULL	ID	FULL	ID	MC	ID	MC	ID	MCL	ID	MCL	ID	MCC01	ID	MCC02
192	73.507	192	74.486	128	72.583	128	73.179	128	72.020	128	74.065	113	74.051	128	73.749
128	72.642	128	73.045	205	71.323	222	71.310	205	71.348	192	71.819	128	73.659	192	73.499
222	70.316	113	68.673	113	70.235	113	70.605	113	69.828	222	71.756	192	73.259	113	72.716
113	69.875	222	68.444	222	68.180	192	69.335	222	69.464	113	69.640	222	71.764	222	71.470
205	69.373	115	65.367	104	66.883	205	68.215	192	68.980	115	68.499	115	69.771	115	69.997
262	68.430	207	65.311	115	66.520	115	68.092	115	65.659	205	67.888	205	69.480	205	69.445
148	66.581	205	65.288	148	65.826	148	67.739	237	65.050	132	67.430	233	65.895	233	66.153
207	66.065	148	65.213	192	65.718	104	67.342	207	64.140	237	65.836	207	64.364	207	64.297
104	65.337	262	64.973	164	64.484	169	64.649	108	64.120	104	64.654	148	64.263	104	64.277
115	64.779	104	63.438	262	64.194	164	63.190	214	64.120	233	64.425	104	64.246	148	63.861
218	62.887	218	61.273	207	63.355	828	62.317	148	64.106	828	64.254	262	63.959	237	63.595
169	62.168	169	60.995	169	62.439	207	62.189	132	63.791	108	63.711	237	63.539	262	63.466
200	61.419	233	60.282	237	62.193	233	61.863	164	63.460	207	63.509	164	62.383	164	62.687
214	61.199	200	58.942	218	61.779	237	61.845	218	63.340	148	63.437	140	62.092	140	62.082
233	60.895	203	58.856	167	61.625	228	61.404	104	63.135	164	61.896	228	61.745	228	61.893
237	60.485	140	58.774	200	61.524	108	60.845	233	62.976	214	61.891	178	61.001	178	60.783
178	60.135	828	58.732	118	60.853	218	60.796	262	62.057	218	61.438	218	60.459	214	60.707
164	59.828	228	58.350	233	60.549	262	60.668	200	61.587	203	60.984	214	60.399	169	60.348
167	59.618	202	58.173	228	60.169	167	59.870	230	59.998	200	60.193	169	60.237	218	59.916
203	59.197	178	58.031	108	60.168	118	59.562	203	59.943	262	59.403	167	59.675	202	59.609
224	59.195	237	57.850	119	59.611	200	59.544	119	59.609	224	58.378	108	59.538	108	59.529
210	59.146	167	57.547	214	58.921	119	58.812	224	59.098	118	58.221	202	58.798	167	59.190
216	58.507	194	57.479	178	58.449	202	58.495	828	58.601	202	58.019	119	58.451	119	58.557
108	58.117	214	57.426	110	58.324	178	58.486	167	58.290	110	57.044	226	57.582	226	57.669
202	57.739	108	57.306	210	58.119	203	57.935	178	58.090	236	56.707	230	57.505	109	57.653
140	57.694	210	57.077	202	58.084	140	57.618	118	58.087	119	56.658	109	57.461	200	57.443
119	57.556	216	56.417	203	57.779	183	57.256	110	57.736	139	56.420	200	57.024	230	57.391
828	57.424	110	55.993	183	57.425	180	56.855	202	57.091	140	56.370	236	56.988	236	56.745
194	57.385	118	55.783	180	57.378	110	56.837	140	56.789	167	56.343	110	56.826	118	56.612
180	57.380	183	55.745	216	56.966	162	56.665	201	56.637	178	56.307	118	56.119	828	56.459
228	57.357	164	55.667	132	56.893	210	56.648	236	56.532	109	56.078	194	55.690	110	55.946
110	57.200	119	55.430	236	56.229	132	56.502	109	56.444	230	56.024	139	55.654	139	55.761
118	56.756	139	55.306	140	56.091	214	56.366	210	56.023	169	55.975	224	55.593	182	55.644
183	55.376	180	55.212	139	56.061	182	56.357	180	55.778	226	55.705	180	55.302	194	55.479
199	54.976	256	55.205	199	55.714	139	55.991	139	55.576	194	55.669	210	55.117	224	55.362
152	54.885	184	54.135	162	54.854	194	55.885	206	55.416	180	55.598	828	55.064	180	55.196
139	54.778	193	54.068	194	54.711	236	55.568	256	55.025	210	55.023	137	54.959	210	55.107
184	54.730	199	53.922	166	54.708	166	55.418	228	54.908	183	54.919	182	54.757	137	54.914
256	54.660	224	53.820	182	54.518	147	55.374	169	54.705	201	54.879	152	54.692	203	54.829
201	53.973	125	53.565	256	53.666	125	54.801	226	54.554	228	54.497	216	54.583	152	54.672

TABLE 14
COMPARISON OF MATH MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

DALLAS		HLM		DALLAS		HLM		DALLAS		HLM		HLM		HLM	
ID	FULL	ID	FULL	ID	MC	ID	MC	ID	MCL	ID	MCL	ID	MCC01	ID	MCC02
109	53.634	182	53.483	131	53.653	199	54.699	162	54.445	182	54.416	132	54.413	132	54.426
182	53.262	109	53.351	109	53.609	137	54.633	193	53.961	152	54.317	183	54.159	183	54.103
162	53.007	137	53.021	226	53.549	226	54.298	199	53.704	216	53.742	203	54.147	216	54.046
125	53.001	226	52.537	213	53.472	109	53.328	194	53.692	256	53.289	263	53.617	193	53.966
206	52.830	152	52.511	201	53.384	213	53.011	183	53.423	147	53.262	131	53.597	263	53.954
236	52.818	206	52.488	147	53.259	216	52.764	182	53.303	137	53.226	193	53.278	131	53.683
158	52.766	230	52.165	125	53.086	184	52.658	225	51.985	162	53.140	125	53.217	125	53.260
230	52.602	158	52.045	137	52.980	131	52.535	147	51.160	177	53.050	256	52.954	256	53.131
213	52.411	201	51.970	126	52.828	224	52.367	156	50.977	184	52.660	147	52.934	147	52.860
132	52.385	236	51.951	828	52.337	177	52.332	131	50.702	199	52.354	177	52.748	177	52.760
137	52.337	213	51.929	152	52.309	149	51.988	149	50.482	125	52.314	158	52.558	265	52.562
226	51.620	186	51.929	149	52.289	263	51.781	158	50.304	193	52.035	265	52.534	158	52.211
156	51.379	132	51.700	184	52.200	201	51.697	189	50.071	827	51.312	201	51.839	199	51.844
147	51.006	147	51.569	263	52.054	152	51.675	184	50.014	264	51.096	199	51.746	201	51.400
126	50.792	162	51.220	106	51.076	158	51.605	213	50.001	225	51.087	213	51.402	213	51.388
159	50.455	827	50.938	224	50.697	256	51.525	137	49.959	149	50.440	149	50.901	149	51.146
166	50.386	126	50.657	158	50.688	126	51.397	125	49.928	229	50.355	184	50.497	184	51.001
149	50.333	159	50.556	177	50.575	106	49.630	263	49.864	213	50.306	136	50.344	827	50.311
136	50.069	153	50.334	156	49.981	225	49.608	153	49.679	158	50.121	827	49.463	136	50.137
114	49.928	136	50.045	129	49.641	827	49.599	177	49.673	136	50.099	162	49.341	229	49.423
225	49.912	177	49.662	219	49.480	219	49.255	114	49.641	131	49.816	229	49.163	162	49.097
131	49.798	166	49.625	114	49.144	264	49.193	216	49.622	263	49.299	153	49.022	206	49.008
153	49.601	149	49.565	265	48.930	206	49.013	126	49.565	153	49.142	166	48.986	153	48.834
219	49.542	131	49.546	230	48.900	153	48.700	827	49.379	156	48.778	126	48.763	166	48.685
827	49.186	156	49.437	225	48.829	136	48.655	198	48.968	130	48.594	206	48.626	211	48.346
129	49.132	114	49.122	189	48.594	114	48.647	173	48.658	114	48.509	211	48.416	219	48.023
186	48.971	225	48.829	193	47.795	193	48.453	229	48.574	206	48.369	219	48.379	204	47.935
263	48.850	129	48.702	264	47.620	211	48.184	264	48.500	126	48.221	204	48.290	126	47.447
106	48.592	219	48.694	235	47.479	145	48.135	219	48.455	198	48.154	114	47.482	114	47.447
177	48.528	263	48.405	198	47.453	230	47.756	152	48.374	211	48.127	225	47.256	130	47.346
265	47.596	211	48.015	827	47.042	130	47.624	181	48.208	189	47.893	150	47.106	225	47.148
235	47.533	106	48.011	175	46.784	265	47.426	166	47.649	145	47.853	168	46.985	168	46.958
168	47.414	229	47.715	173	46.772	229	47.329	106	47.406	129	47.687	130	46.981	209	46.922
185	47.317	145	47.621	229	46.685	156	46.817	235	47.345	219	46.986	186	46.904	186	46.918
211	46.762	150	47.478	204	46.372	204	46.566	136	46.886	186	46.950	156	46.694	156	46.837
229	46.741	185	47.313	185	46.328	175	46.310	211	46.865	173	46.847	209	46.516	150	46.789
142	46.422	265	47.066	130	46.327	198	45.993	175	46.761	181	46.766	145	46.383	145	46.700
189	46.091	235	46.634	209	46.288	209	45.958	129	46.443	265	46.748	187	45.785	175	45.292
150	46.021	101	46.082	136	46.192	101	45.825	185	46.396	175	46.325	175	45.506	187	45.276
173	45.875	168	46.071	187	46.145	186	45.662	130	46.159	209	45.881	129	45.065	129	45.171

TABLE 14
COMPARISON OF MATH MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

DALLAS		HLM		DALLAS		HLM		DALLAS		HLM		HLM		HLM	
ID	FULL	ID	FULL	ID	MC	ID	MC	ID	MCL	ID	MCL	ID	MCC01	ID	MCC02
145	45.485	209	45.606	153	46.128	150	45.526	204	45.804	235	45.818	235	44.924	106	44.929
181	45.360	142	45.538	211	46.067	187	45.495	265	45.801	185	45.333	106	44.297	235	44.687
209	45.128	173	44.964	217	46.033	235	45.451	170	45.654	150	45.229	173	44.116	181	44.276
101	44.961	198	44.889	150	45.958	217	44.697	116	45.446	106	45.153	181	44.099	173	43.856
198	44.790	181	44.829	206	45.911	185	44.657	209	45.232	116	44.996	101	43.950	101	43.602
105	43.840	264	44.713	101	45.718	116	44.415	168	45.156	168	44.928	170	43.239	116	43.417
264	43.555	175	44.570	145	45.505	173	43.877	145	44.970	166	44.807	116	43.158	170	42.912
170	43.121	130	44.563	116	44.839	181	43.846	150	44.941	163	44.057	157	42.968	157	42.864
116	43.047	189	44.454	181	44.797	189	43.401	186	44.252	101	43.967	185	42.463	189	42.404
175	43.016	204	43.733	105	44.537	121	43.383	163	43.982	197	43.491	159	42.030	185	42.291
204	42.849	267	43.625	186	44.437	129	43.313	101	43.661	170	43.140	142	41.945	197	42.235
130	42.790	163	43.272	267	43.714	267	42.978	142	43.376	121	41.671	105	41.864	105	42.025
187	42.690	116	42.964	170	43.416	159	42.775	120	43.103	159	40.607	171	41.755	142	41.775
121	42.269	170	42.945	121	43.248	168	42.616	127	42.959	174	40.252	189	41.408	171	41.755
193	42.205	157	42.867	168	43.081	105	42.153	105	42.878	127	40.194	197	41.315	159	41.109
157	42.062	105	42.810	159	43.053	163	41.756	187	42.647	142	40.117	190	40.959	190	40.819
120	42.050	121	42.724	163	42.939	157	41.188	174	42.170	105	40.090	121	40.482	264	40.480
163	41.605	187	42.424	142	42.391	170	41.051	159	42.065	190	39.928	264	40.446	117	40.318
267	41.439	197	42.266	127	41.901	142	40.945	121	41.481	187	39.911	267	40.405	163	40.254
217	41.378	190	41.215	120	41.148	190	40.571	197	41.242	267	39.601	117	39.803	121	40.117
174	41.184	217	41.163	250	40.336	197	40.306	217	40.521	120	39.282	163	39.795	267	39.548
197	41.019	174	40.379	157	39.984	127	39.230	267	39.856	204	39.138	174	39.322	174	39.128
190	40.889	120	40.150	212	39.308	212	38.406	212	39.120	217	38.954	120	39.270	120	39.080
127	39.602	220	40.082	190	38.391	112	37.961	250	39.080	212	38.635	112	38.898	195	38.923
212	39.402	212	39.752	112	38.197	195	37.952	220	38.337	220	38.217	198	38.821	112	38.636
220	37.950	117	39.733	232	37.999	220	37.837	190	38.122	232	37.458	195	38.797	161	38.507
117	36.836	188	38.998	197	37.037	117	37.524	157	36.047	157	37.453	127	38.498	127	38.467
250	36.418	171	38.637	174	36.801	188	37.185	232	35.952	117	37.161	161	38.239	217	38.293
188	36.130	127	37.621	220	36.256	120	36.775	117	35.914	112	36.658	217	38.167	198	38.083
161	35.062	195	36.694	117	35.472	250	35.439	112	35.496	161	35.665	212	37.366	212	37.043
112	34.791	112	36.435	188	34.962	232	35.038	144	34.778	250	35.018	188	36.388	188	36.938
171	33.666	161	35.238	144	34.104	174	34.769	161	34.641	188	34.776	220	35.855	220	35.752
195	33.346	250	34.911	161	33.829	171	33.619	171	34.244	171	34.690	250	35.337	250	35.381
144	32.737	215	34.086	195	32.787	144	33.376	133	33.971	144	34.592	232	33.862	232	34.271
232	31.950	133	33.920	171	30.906	161	32.935	188	31.472	133	33.496	133	33.111	133	32.972
133	31.945	251	33.091	133	29.613	251	32.093	215	28.161	215	30.692	144	30.661	144	31.052
124	28.288	144	32.453	215	25.742	215	29.422	124	27.586	251	29.592	251	30.237	251	29.588
215	27.678	232	32.247	124	23.287	133	29.343	195	26.436	195	29.376	215	27.024	215	27.288
251	20.998	124	27.845	251	22.241	124	19.635	251	22.158	124	24.727	124	26.778	124	26.429

TABLE 14
COMPARISON OF MATH MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
113	74.616	113	74.871	113	74.683	192	73.645	192	73.096	192	78.337	128	61.615	828	63.285
128	73.638	128	73.406	128	73.204	222	71.311	128	72.398	222	73.209	222	59.904	233	60.615
192	73.220	192	73.188	192	73.192	128	71.080	222	71.268	115	73.202	115	59.420	113	59.413
222	71.349	222	71.598	222	72.432	115	70.668	115	70.530	128	68.689	192	58.930	193	58.149
115	70.668	205	70.914	115	71.420	108	68.973	108	69.318	113	67.371	113	58.215	224	57.425
205	70.485	115	70.558	205	70.400	113	68.766	113	67.618	233	67.152	108	57.961	203	57.245
233	65.534	207	65.478	262	65.938	148	67.495	207	67.404	262	66.629	140	57.427	162	57.212
207	64.662	233	65.389	207	64.642	218	66.817	148	67.328	148	65.496	164	56.558	153	56.707
148	64.073	262	64.405	233	64.418	207	66.673	218	66.263	207	65.146	218	56.226	166	56.432
237	64.041	148	63.548	237	63.077	233	66.649	233	66.085	140	64.420	228	56.006	230	56.368
262	63.720	237	63.289	104	62.829	228	64.333	262	64.269	237	64.171	167	55.803	148	56.335
104	63.213	104	62.917	140	62.817	119	64.006	228	64.025	104	63.445	104	55.754	119	56.231
164	62.401	164	62.897	148	62.695	262	63.817	119	63.473	228	63.244	205	55.488	118	55.230
140	62.134	228	62.569	164	62.557	104	63.721	226	63.020	164	63.180	127	55.274	169	55.081
178	61.967	140	61.926	228	61.907	226	63.265	140	62.864	218	62.936	262	55.089	218	54.893
228	61.675	218	61.084	178	61.557	237	62.200	104	62.764	119	62.129	148	55.039	192	54.836
218	60.470	178	60.886	202	61.366	140	61.976	237	62.509	108	62.076	237	54.887	132	54.553
108	60.032	169	60.457	169	60.834	164	61.556	164	62.086	178	61.614	226	54.761	827	54.456
169	59.979	202	60.097	218	60.497	169	61.538	214	61.642	226	61.488	207	54.754	108	54.449
202	59.407	108	59.923	119	59.619	203	60.610	205	61.450	214	61.112	194	54.467	159	54.386
214	59.403	119	58.730	108	58.485	214	60.398	169	61.185	169	60.875	139	54.167	125	54.337
119	57.820	214	58.240	230	58.485	205	60.230	203	60.356	205	59.337	210	54.019	222	54.148
236	57.629	828	57.419	182	58.059	167	60.116	263	59.523	203	58.078	178	53.915	207	54.116
109	57.597	226	57.249	214	57.729	263	59.300	167	59.142	183	58.033	119	53.449	183	54.011
226	57.284	109	57.237	194	57.729	178	58.740	118	58.614	230	57.175	214	53.446	199	53.640
118	56.980	236	56.986	183	56.872	147	58.106	178	58.432	263	57.067	109	53.393	182	53.569
200	56.842	230	56.740	131	56.860	118	57.873	147	56.794	167	56.838	147	53.291	128	53.490
828	56.793	194	56.675	110	56.726	199	56.586	199	56.763	158	56.440	137	53.168	200	53.255
230	56.639	118	56.335	236	56.705	183	55.776	183	55.837	136	56.290	236	53.029	198	52.938
110	56.071	110	55.979	226	56.348	209	55.591	210	55.590	152	55.860	131	52.937	115	52.820
183	55.957	183	55.935	109	56.185	210	55.438	209	55.401	210	55.641	116	52.912	147	52.789
167	55.925	200	55.833	118	56.071	139	55.373	200	54.698	147	55.607	256	52.717	228	52.717
139	55.799	182	55.676	167	55.734	158	54.868	158	54.407	209	55.393	201	52.429	104	52.676
194	55.779	139	55.421	200	55.364	132	54.317	139	54.268	131	55.165	180	52.429	156	52.608
132	55.507	152	55.154	137	55.080	182	54.180	182	54.242	118	55.104	263	52.094	158	52.412
182	55.446	167	55.024	132	55.055	200	53.580	131	54.172	132	54.926	169	52.075	195	52.377
210	55.263	224	54.931	828	54.962	131	53.484	180	53.610	182	54.844	216	51.910	142	52.319
152	55.186	132	54.927	193	54.864	162	53.265	132	53.478	199	53.588	199	51.832	180	52.163
216	55.154	210	54.434	139	54.856	152	53.082	152	53.287	236	53.571	182	51.822	205	51.914
224	55.085	137	54.203	203	54.531	114	52.937	256	53.181	114	53.216	152	51.757	202	51.873

TABLE 14
COMPARISON OF MATH MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
137	54.849	131	54.001	152	53.865	256	52.894	114	53.046	256	52.743	136	51.745	212	51.844
263	54.107	263	53.916	210	53.438	180	52.876	194	53.040	827	52.703	184	51.699	263	51.770
193	53.823	193	53.839	224	53.373	194	52.816	162	52.641	139	52.680	177	51.534	178	51.747
203	53.807	203	53.540	216	53.174	236	52.197	236	52.635	216	52.456	150	51.481	110	51.524
180	53.729	180	53.515	219	52.963	136	52.003	189	52.613	828	52.227	110	51.258	211	51.426
256	53.510	216	53.382	256	52.926	109	51.969	136	52.442	130	52.177	233	51.218	168	51.302
131	53.502	158	53.378	263	52.796	130	51.615	130	51.691	194	51.875	186	51.066	213	51.271
265	53.060	256	53.155	213	52.638	125	51.129	153	51.155	224	51.873	130	50.928	214	51.213
147	52.906	177	53.083	184	52.203	153	50.896	156	51.075	109	51.743	162	50.867	171	51.182
158	52.654	265	53.050	180	52.191	156	50.776	201	50.930	219	51.367	204	50.836	106	51.151
213	52.654	213	52.452	201	52.178	204	50.191	109	50.805	200	51.303	213	50.664	114	51.146
177	52.646	149	51.760	199	52.146	211	50.146	110	50.783	180	51.288	229	50.620	126	51.031
201	51.879	199	51.756	136	52.073	189	50.058	125	50.544	193	51.139	203	50.535	236	50.845
149	51.676	201	51.744	125	52.016	110	49.586	202	49.968	110	51.099	145	50.315	120	50.507
125	51.583	147	51.505	158	51.613	201	49.235	204	49.772	137	50.728	181	50.297	167	50.404
219	51.339	219	51.444	147	51.536	186	49.124	211	49.548	168	50.711	209	50.267	237	50.214
184	50.593	184	51.371	177	51.073	202	48.944	216	49.239	265	50.039	158	50.200	206	50.121
199	50.268	125	51.003	265	50.671	181	48.910	142	48.871	145	49.664	163	50.102	149	50.060
136	50.268	136	50.809	149	50.342	142	48.810	186	48.698	156	49.529	132	50.096	173	49.989
827	50.166	229	49.867	827	50.045	827	48.757	145	48.679	213	49.104	200	50.054	194	49.876
229	49.343	211	48.515	145	48.765	137	48.738	181	48.643	142	48.967	168	49.975	209	49.751
225	48.421	130	48.378	168	48.651	216	48.703	177	48.635	181	48.920	126	49.918	201	49.602
211	48.369	162	48.301	150	48.159	145	48.701	213	48.435	202	48.898	187	49.833	226	49.508
114	48.101	225	48.176	225	47.936	230	48.677	168	48.363	125	48.809	206	49.716	210	49.340
206	47.833	168	48.176	153	47.802	177	48.607	827	48.153	186	48.715	264	49.714	235	49.297
204	47.780	204	48.176	114	47.773	101	48.275	193	48.138	211	48.677	185	49.477	152	49.286
130	47.464	206	47.892	235	47.371	193	48.163	101	48.003	204	48.497	219	49.472	220	49.276
162	47.379	114	47.456	162	47.326	126	47.987	166	47.707	153	48.149	175	49.469	232	48.890
186	47.362	186	47.379	206	47.282	168	47.873	137	47.670	177	47.825	183	49.431	129	48.808
150	47.188	153	47.302	229	47.212	213	47.851	184	47.370	189	47.645	129	49.430	262	48.749
168	47.135	150	47.237	186	47.143	828	47.748	126	47.307	175	47.552	149	49.398	101	48.706
166	47.115	145	47.176	130	47.046	166	47.502	173	47.253	162	47.456	118	49.373	229	48.504
153	46.997	166	47.148	156	47.021	173	47.447	230	47.034	201	47.401	101	49.373	164	48.489
175	46.802	156	47.112	209	47.001	198	47.443	198	46.990	149	47.340	202	49.354	131	48.472
235	46.750	827	46.800	175	46.388	185	47.153	149	46.974	101	47.313	170	49.092	109	48.451
145	46.595	209	46.719	211	46.383	224	47.127	185	46.704	185	47.145	189	48.959	267	48.358
209	46.445	235	46.509	204	46.091	149	47.095	229	46.410	150	47.100	230	48.644	187	48.287
156	46.271	175	46.129	166	46.058	206	46.238	828	46.344	267	46.784	225	48.641	174	48.250
129	45.301	173	45.995	116	45.315	150	46.093	224	46.108	173	46.345	265	48.366	189	48.126
106	44.992	129	44.895	126	45.254	129	45.924	106	45.925	126	46.323	157	48.363	197	48.124

TABLE 14
COMPARISON OF MATH MODELS
(ARRANGED INDIVIDUALLY BY MODEL)

ID	HLM MCC03	ID	HLM MCC04	ID	HLM MCC05	ID	HLM L	ID	HLM LB	ID	HLM LC	ID	GAINS	ID	NCE
126	44.798	106	44.693	181	45.172	106	45.785	175	45.627	127	45.881	211	48.295	130	48.077
181	44.270	101	44.640	101	45.026	175	45.677	129	45.618	166	45.207	250	48.277	139	47.969
173	43.734	181	44.450	157	44.474	184	45.586	150	45.525	157	45.154	117	48.191	251	47.957
101	43.653	116	44.235	129	44.413	267	45.575	206	45.516	184	44.820	105	48.174	140	47.851
116	43.532	126	43.730	173	44.226	127	45.211	267	45.016	235	44.751	114	48.143	219	47.791
185	43.174	157	43.653	185	43.990	229	45.178	127	44.829	229	44.660	173	48.057	105	47.733
157	43.146	185	43.256	106	43.815	116	44.849	116	44.500	105	43.341	156	47.981	181	47.714
189	42.614	142	42.104	142	42.369	159	43.920	159	43.831	225	43.093	121	47.675	265	47.656
142	42.416	197	42.071	112	42.291	219	43.892	250	43.731	112	42.947	153	47.671	145	47.650
187	42.375	187	42.035	197	42.226	265	43.340	265	43.720	116	42.863	224	47.638	121	47.605
121	41.843	190	41.982	187	42.096	225	43.266	219	43.462	198	42.472	166	47.401	144	47.508
264	41.563	189	41.909	120	41.905	264	42.739	197	43.442	121	42.321	827	47.340	136	47.280
190	41.332	159	41.582	105	41.605	121	42.639	121	42.897	197	42.168	190	47.228	256	47.226
197	41.304	121	41.444	121	41.475	157	42.537	225	42.862	106	42.124	112	47.224	225	47.107
105	41.121	264	41.218	189	41.434	105	42.318	264	42.384	250	41.651	267	47.145	215	47.097
170	40.853	105	41.149	267	41.040	197	42.259	105	42.180	129	41.086	106	47.113	185	47.054
159	40.760	120	40.744	195	40.430	235	42.180	157	42.143	206	41.066	198	46.955	137	46.930
171	40.484	267	40.053	190	40.333	250	42.090	235	41.829	159	40.577	217	46.946	177	46.821
267	39.916	112	39.956	264	40.133	187	41.984	163	41.571	220	40.098	235	46.905	190	46.749
117	39.774	195	39.883	159	39.934	163	41.206	187	41.254	120	39.973	125	46.866	184	46.609
120	39.612	174	39.502	127	39.780	170	40.909	170	41.171	232	39.843	161	46.379	204	46.582
163	39.555	163	39.446	171	39.658	112	40.560	112	40.903	264	39.265	193	46.333	175	46.572
112	38.918	117	39.430	170	39.349	232	40.514	120	40.074	171	39.160	828	46.290	188	46.478
127	38.686	170	39.341	188	39.248	120	40.425	232	39.950	187	38.923	159	46.236	216	46.362
161	38.670	171	39.337	163	38.788	220	38.719	220	38.155	163	38.688	188	46.213	161	46.328
195	38.544	127	38.649	217	38.719	217	37.752	217	38.039	161	38.430	197	46.037	133	46.166
174	38.512	161	38.192	117	38.459	195	37.433	195	36.675	188	38.373	174	45.918	170	46.117
217	37.984	198	37.751	161	38.252	161	36.288	161	35.912	217	37.960	120	45.614	112	45.926
220	37.311	220	37.342	174	38.146	171	35.768	174	35.547	195	37.713	171	45.524	157	45.848
198	37.002	217	37.112	198	38.061	174	35.577	171	35.208	170	37.345	133	44.639	117	45.249
212	36.649	188	37.075	220	37.610	133	34.297	251	34.895	190	36.779	220	44.400	264	45.014
188	36.515	212	36.574	212	35.611	251	34.254	117	34.756	174	35.366	195	44.171	217	44.854
250	35.821	232	35.303	232	34.822	117	34.089	190	34.315	133	34.544	142	43.507	186	44.448
232	35.302	250	35.194	250	34.810	190	33.710	133	34.113	251	33.794	232	43.462	150	44.334
133	33.833	133	33.523	133	33.091	212	33.440	188	33.919	117	33.602	212	42.945	116	43.324
144	31.183	144	30.858	144	31.315	188	33.374	212	33.418	144	29.968	124	41.827	163	42.531
251	30.509	251	30.558	251	30.295	144	31.262	144	30.895	212	29.774	251	40.606	250	41.934
215	28.752	215	28.151	215	28.792	215	25.451	124	25.974	215	27.289	215	39.178	124	41.551
124	25.875	124	25.307	124	24.785	124	25.330	215	25.409	124	26.526	144	38.767	127	40.124

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